

# Research on the Teaching Mode of Computer Foundation Public Course in Vocational Technical Colleges Based on “Internet +”--Taking Lanzhou Vocational Technical College in Gansu Province as an Example

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## *Abstract:*

By means of investigation and comparison, this paper studies the application effect of the mixed teaching mode of “two courses and one micro” in the course of Computer Foundation in higher vocational colleges, and randomly divides the investigated students into observation group and control group. The observation group adopts the traditional teaching mode while the control group adopts the traditional teaching mode. The results showed that the students’ learning ability and assessment scores in the observation group were significantly higher than those in the control group ( $P < 0.05$ ). It is concluded that the teaching effect of the mixed innovative teaching mode of “two courses and one micro” adopted by the teachers of the common course of Computer Foundation in higher vocational colleges is extremely remarkable, which is worth popularizing in the teaching of the common course of Computer Foundation in higher vocational colleges.

**Keywords:** *Internet +, Teaching mode, Two lessons and one micro, Blended teaching.*

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## I. INTRODUCTION

The 2019 government Work Report once again puts forward: “Develop ‘Internet+ Education’ and promote the sharing of high-quality resources”. At present, China has ushered in the 5G era. Under the “Internet +” environment, new technologies such as blockchain

technology, Internet of Things technology, big data technology and cloud computing provide platforms and technical means for the development of education industry in the new era. Exploring the general trend of classroom teaching reform under the background of “Internet +” also provides new ideas and directions for classroom teaching reform in higher vocational colleges.

In the era of “Internet +”, Online teaching and offline mobile learning came into being, With the popularity of notebooks and mobile phones among college students and the characteristics of students' mobile phones, Mobilize students to flexibly control fragmented time according to their own situation, and conduct online and offline hybrid learning through mobile terminals, thus breaking the limitations of time and space, realizing multi-directional communication and interaction between teachers, students and students, and students can obtain their own learning resources anytime and anywhere to meet their personalized learning needs [1, 2].

In the era of “Internet +”, the Internet platform provided high-quality educational resources. Mobile terminals have once again realized the deep integration of education and Internet. Micro-Class, MOOC and WeChat platform explored by using “Internet +” APP resources are widely used in teaching practice. The production of Micro-Class and MOOC can not only rely on network resources, but also be independently produced according to the situation of our school and the content of professional knowledge, so as to construct situational teaching, which is convenient for students to understand and learn, and can realize interactive presentation with users [3]. Micro-Class is a short digital Micro-Class, Mainly through multimedia technology and network technology, teaching activities for about 10 minutes are carried out around a certain teaching link and knowledge points. MOOC is a large-scale open online course, which is the product of “Internet +” and a newly emerged innovative online course development mode. MOOC has the characteristics of networking, informationization and even intelligence [4]. WeChat is a free program based on smart phone applications. WeChat supports cross-operating system platforms, quickly sends voice, video and picture information through smart phones, and supports multi-crowd chat. Therefore, the wide use and popularization of smart phones in China makes teaching and learning with WeChat very operational and feasible [5]. The development and application of mixed teaching and learning brought by Internet technology, such as MOOC, micro-course, WeChat platform, rain classroom, cloud platform, VR, etc., has become the driving force of teaching reform in the information age and gradually penetrated into various kinds of education, such as chemistry, English, medicine, biology, physics, computer technology and other disciplines.

Therefore, as a compulsory public basic course in higher vocational colleges, The

traditional teaching mode can no longer meet the teaching needs of higher vocational colleges, For higher vocational colleges shouldering the responsibility of cultivating skilled and applied talents, keep up with the pace of the Internet age, explore efficient classroom teaching in higher vocational colleges with Internet thinking, reorganize teaching system, innovate teaching mode, impart knowledge and skills with the times, and cultivate students' innovative ability and practical ability. Against this background, Taking nine higher vocational colleges in Lanzhou City of Gansu Province as examples, This paper investigates the teaching mode adopted by the teachers of Computer Foundation in higher vocational colleges at present, constructs a mixed teaching mode of “two courses and one micro” based on “Internet +” platform and integrating the functions of “Internet +” platform with Micro-Class, MOOC and WeChat, and compares and analyzes the teaching effect and learning effect of “two courses and one micro” teaching mode. The research shows that the mixed teaching mode of “two courses and one micro” is not only conducive to mobilizing students' enthusiasm and initiative, but also conducive to the interaction between teachers and students, creating a new type of teacher-student relationship of equality and mutual assistance between teachers and students.

## **II. THE RESEARCH OBJECT AND METHOD**

This paper, questionnaire survey and comparison are adopted, Lanzhou Petrochemical University of Vocational Technology (LZPVTC) in Lanzhou City, Gansu Province, Gansu Vocational and Technical College of Architecture (GSCVTC), Lanzhou Vocational and Technical College (LZVTC), Gansu Police Vocational College (GSPVC), Gansu Communications Vocational and Technical College (GSTVTC), Lanzhou Resources and Environment Vocational and Technical College (LZREVTC), Gansu Agricultural Vocational and Technical College (GSAVTC), Gansu Health Vocational College (GSHVC), Gansu Energy and Chemical Vocational College (GSECVC), etc. A questionnaire survey was conducted from the teaching mode under the background of “Internet+” from 2013 to 2019, in which 215 teachers' questionnaires were distributed and 215 questionnaires were recovered. In recent years, the trend of teachers of computer public courses in different colleges using new media teaching modes such as micro-course, MOOC and WeChat was analyzed. Questionnaires and interviews were conducted among students in 20 classes in 9 colleges and universities, 400 questionnaires were distributed and 400 questionnaires were recovered, and statistical analysis was made on students' learning effect, learning participation and learning continuity after the teaching reform with Internet thinking. According to the research data, there are 6 classes in Lanzhou Vocational and Technical College, including Hotel Management Class 191 (A144 students), Hotel Management Class 192 (B141 students), Wedding Service and Management Class 191 (C137 students), Tourism Service and Management Class 192 (A243 students), Preschool Education Class 187 (B240 students) and Preschool Education

Class 188 (C239 students), which are divided into observation group and control group. The control group adopted the traditional face-to-face multimedia teaching mode, the observation group adopts the mixed teaching mode of “two courses and one micro”, and each group has three repetitions (three classes). The observation group is hotel management class 191 (A1), preschool education class 187 (B2) and wedding service and management class 191 (C1), while the control group is tourism service and management class 192 (A2), hotel management class 192 (B1) and preschool education class 188 (C2) The results of data calculation were expressed by mean  $\pm$  standard deviation ( $\bar{x} \pm S$ ). DPS7.05 statistical software was used for variance analysis, new complex range method was used for multiple comparisons, and Excel was used for drawing.

### **III. CONSTRUCTION OF “TWO COURSES AND ONE MICRO” MIXED TEACHING MODE OF “COMPUTER BASIS” PUBLIC COURSE UNDER THE BACKGROUND OF “INTERNET +”**

Under the background of “Internet+”, using the powerful functions and convenient operation of mobile terminals, it is very suitable for the mixed teaching mode of “two courses and one micro”. Teachers publish learning resources, assign homework, communicate, discuss and evaluate online through notebooks and mobile phones. By analyzing the disadvantages of the traditional teaching process of Computer Foundation, the research team constructed a mixed teaching mode of “two courses and one micro” based on the background of “Internet +”, as shown in Fig. 1 The mixed teaching mode consists of three parts: pre-class stage, classroom stage and after-class stage. In the pre-class stage, micro-class and WeChat platform are mainly used to send learning task lists, micro-videos and targeted exercises; in the class stage, face-to-face + MOOC is mainly used to solve problems and strengthen classroom training; in the after-class stage, WeChat platform is mainly used for after-class reflection and outward bound training.

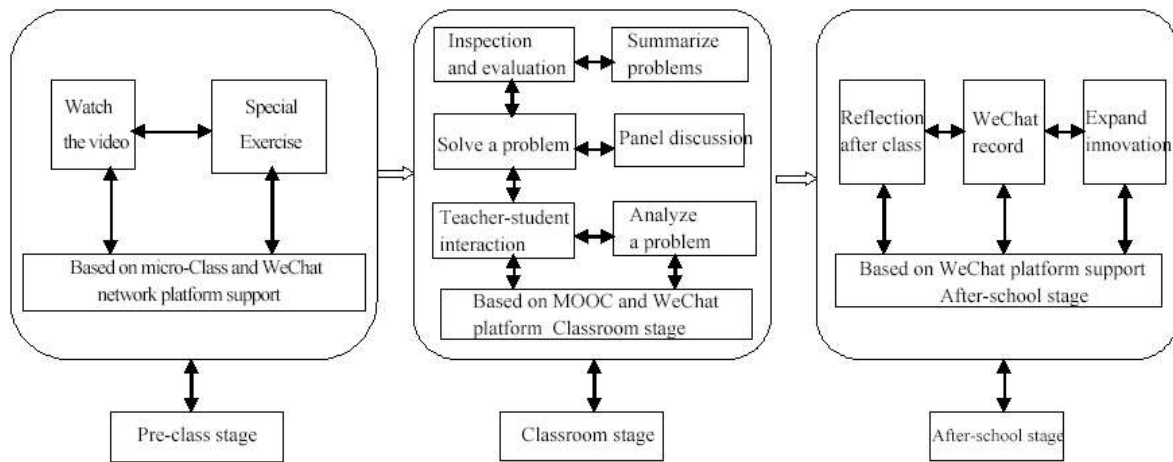


Fig 1: “Two Courses and One Micro” Mixed Teaching Mode of Computer Basic Course under the Background of Mobile “Internet +”

#### IV. RESULTS AND ANALYSIS

##### 4.1 Investigation on the Teachers Who Adopt the Traditional Teaching Mode of Computer Basis in Higher Vocational Colleges in Lanzhou City, Gansu Province.

Fig. 2 The survey results show that from 2013, under the background of “Internet +”, the number of teachers adopting traditional teaching mode in the public course of Computer Foundation in 9 public higher vocational colleges in Lanzhou City, Gansu Province has been decreasing year by year. The number of teachers using traditional teaching methods in LZPVTC decreased from 20 in 2013 to 5 in 2019. The decrease was 75.00%, the linear equation is  $y=1.9571x$ ,  $R^2=-2.6239$ , Its change course shows negative correlation, GSCVTC dropped from 22 in 2013 to five in 2019, The decrease was 77.27%, The linear equation is  $y=-2.2071x$ ,  $R^2=-2.7955$ , There is a negative correlation between its transformation process, LZVTC, GSPVC, GSTVTC, LZREVTC, GSAVTC, GSHVC and GSECVC decreased by 70.58%, 81.25%, 72.22%, 73.68%, 72.22%, 76.37% and 76.00 respectively. The linear equations were  $Y=1.6X$ ,  $Y=1.6857X$ ,  $Y=1.9214X$ ,  $Y=1.9145X$ ,  $Y=2.1214X$  and  $Y=2.5429X$  respectively the big one.

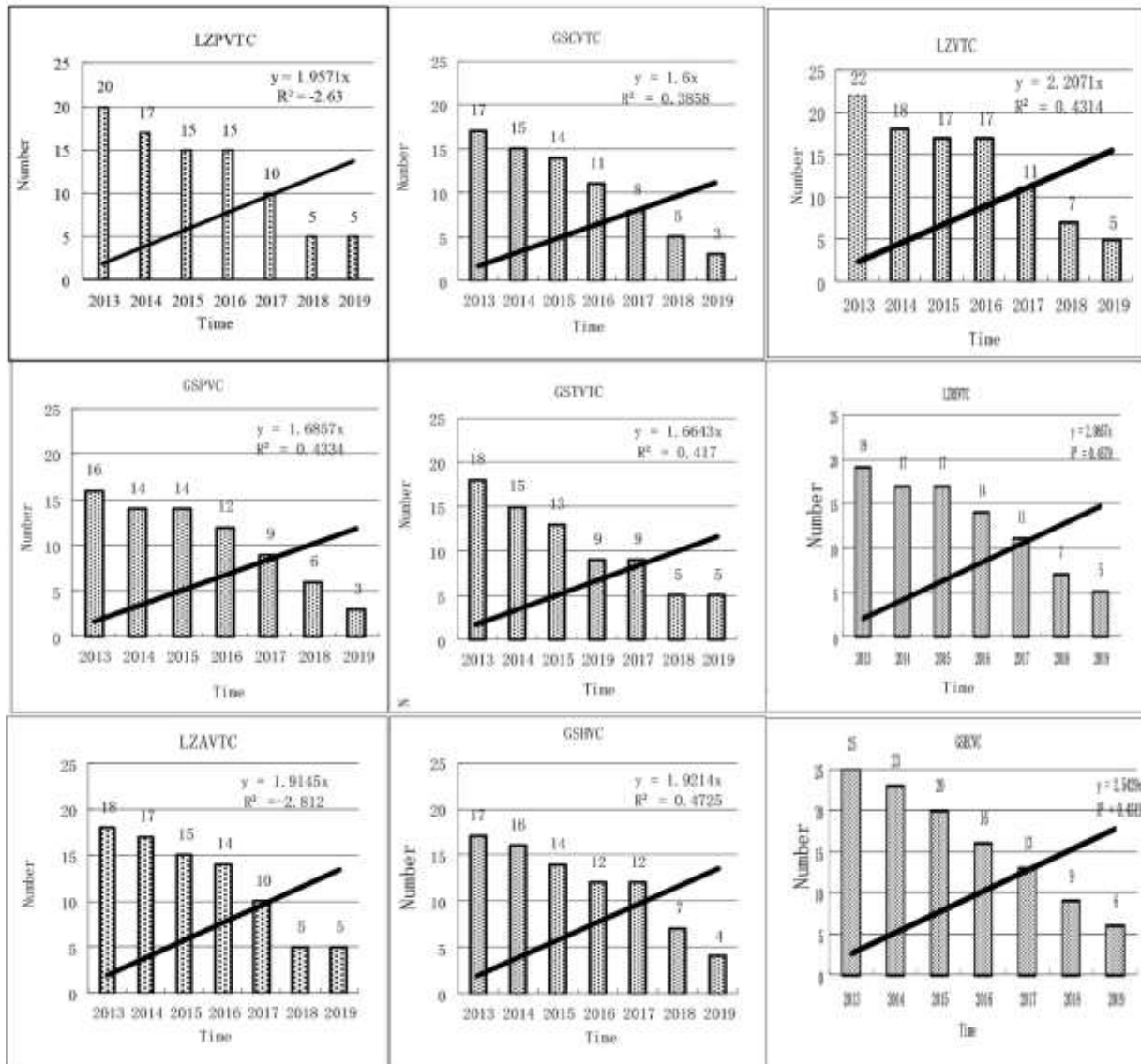


Fig 2: The number and changing trend of teachers adopting traditional teaching mode in the public course of “Basic Computer Course” in 9 higher vocational colleges in Lanzhou City, Gansu Province (n=215)

#### 4.2 The New Teaching Mode and Quantity Adopted by the Teachers of the Common Course “Computer Basis” in Higher Vocational Colleges in Lanzhou City, Gansu Province

The results in Fig. 3 show that the order of the total number of teachers adopting four new teaching modes in nine colleges is GSHVC > GSVTC > GSTVTC > LZPVTC=GSCVTC > GSPVC=LZREVTC > GSECVC > GSAVTC, among which the largest number of GSHVC has 10 people, which is 150% higher than the smallest number of GSAVTC. In all the surveyed



higher vocational colleges, except GSPVC has at least one teacher using WeChat platform and GSHVC has at most four teachers using micro-course + MOOC teaching mode, the other six colleges have the largest number of teachers using micro-course teaching mode, and few colleges have adopted micro-course + MOOC + WeChat mixed teaching mode, only LZPVTC has one person; The total number of people adopting micro-course, MOOC, WeChat platform and new teaching modes of micro-course + MOOC, micro-course + MOOC + WeChat in 9 colleges is 13, 15, 20, 13 and 1 respectively. It shows that GSHVC has adopted four new teaching modes for the public course of Computer Foundation, while LZPVTC has adopted the mixed teaching mode of micro-course + MOOC + WeChat for the first time, which is at the forefront of the teaching reform in Lanzhou higher vocational colleges.

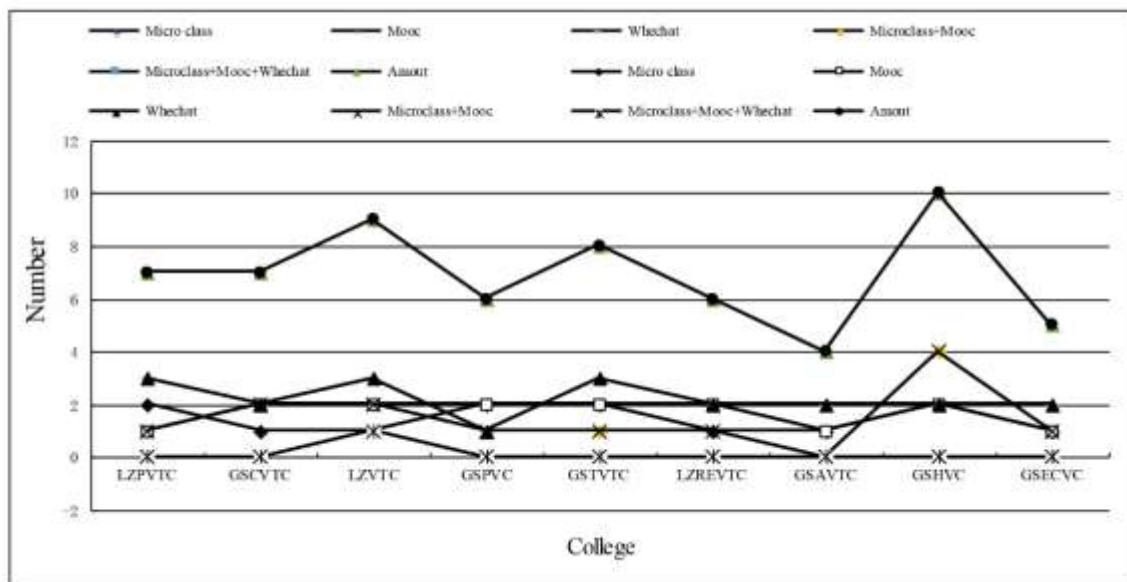


Fig 3: What teachers of Computer Foundation are currently adopting in higher vocational colleges in Lanzhou City, Gansu Province Investigation results of new teaching mode (n=62)

#### 4.3 This Paper Investigates the New Teaching Mode that Students Like to the Public Course “Computer Basis” in Gansu Higher Vocational Colleges and the Evaluation of Teachers' Teaching Effect

Table I shows the investigation and analysis of the mixed teaching mode that students in higher vocational colleges in Lanzhou City, Gansu Province like for the current public course of Computer Basis, and the analysis of students' evaluation results on teachers' teaching effect, the order of students' preference for the four new teaching modes is micro-class + MOOC > WeChat platform > MOOC > micro-course. The maximum number of students who like micro-course + MOOC teaching mode is 118, accounting for 29.5% of the total number, and the

number of students who like WeChat platform teaching mode is 105, accounting for 26.3% of the total number, only 13 less than micro-class + MOOC, and 82 people who like the least number of Micro-Class, accounting for 13.8% of the total number, 13 less than MOOC and 36 less than micro-class + MOOC The number of students who evaluated the micro-class + MOOC teaching mode as good or better is the largest, and the number of students who evaluated the micro-class + MOOC, WeChat platform, MOOC and micro-course as good is 48, 40, 36 and 27 respectively, and the number of micro-course + MOOC has increased significantly by 77.78% compared with micro-course, and the differences among the four new teaching modes have reached a very significant level ( $P < 0.01$ ). The maximum number of people with poor evaluation in MOOC is 19, followed by WeChat platform is 18, and the minimum number of people with micro-course + MOOC is 10, which is significantly reduced by 47.37% compared with the largest MOOC ( $P < 0.01$ ). It shows that students like teachers to use mixed teaching mode in the teaching mode of the common course of Computer Basis.

**TABLE I. Investigation and Analysis Of The New Teaching Mode That Students in Higher Vocational Colleges in Gansu Province Like for the Current Public Course “Computer Basis” and the Evaluation of Teachers' Teaching Effect (N=400)**

SATISFACTI ON	GOOD	BETTER	GENER AL	DIFFERE NCE	TOTAL/PE RSON	PROPO RTION/ %
MICRO-CLASS	27±2.70 <sup>dD</sup>	22±2.25 <sup>bB</sup>	16±3.11 <sup>bA</sup>	17±2.31 <sup>abA</sup>	82	13.8
MOOC	36±3.08 <sup>cC</sup>	25±3.02 <sup>bAB</sup>	15±2.96 <sup>bA</sup>	19±3.01 <sup>aA</sup>	95	23.8
WECHAT	40±2.71 <sup>bB</sup>	32±5.98 <sup>abA</sup>	15±1.44 <sup>bA</sup>	18±2.42 <sup>aA</sup>	105	26.3
MICRO-CLASS +MOOC	48±3.85 <sup>aA</sup>	37±7.45 <sup>aA</sup>	23±2.49 <sup>aA</sup>	10±1.88 <sup>bA</sup>	118	29.5

Note: Different capital letters in the same column indicate significant difference ( $P < 0.01$ ), and different lowercase letters indicate significant difference ( $P < 0.05$ ).

#### 4.4 Influence of “Two Courses and One Micro” Mixed Teaching Mode on Students' Learning Effect of Computer Basis in Lanzhou Vocational and Technical College

The results in Table II show that the mixed teaching mode of “two courses and one micro” has a significant impact on students' learning effect. By analyzing the mixed teaching mode of “two courses and one micro” constructed by Lanzhou Vocational Technical College, The



students in the observation group have six aspects: mastering theoretical knowledge, practical operation and analysis ability, improving learning efficiency, self-study ability, innovative thinking and actively sharing opinions. The average scores of Class A1, Class B2 and Class C1 are 94.7, 93.5 and 95.0 respectively, which are higher than those of Class A2, Class B1 and Class C2 in the control group, which are 87.0, 89.7 and 88.8 respectively. Students' ability to master theoretical knowledge, practical operation and analysis, improve learning efficiency, self-study ability, innovative thinking and actively share opinions, the average scores of the observation group are 95.7, 97.3, 97.0, 90.7, 91.3 and 94.3 respectively, which are higher than those of the control group (89.7, 90.3, 92.3, 86.3, 84.3 and 88.2 respectively) The results of variance analysis showed that there was no significant difference in self-study ability between the observation group and the control group ( $P > 0.05$ ), but there were significant differences in theoretical knowledge mastery, operation and analysis ability, innovative thinking and active sharing of opinions between the observation group and the control group ( $P < 0.05$ ), especially in self-study ability between the observation group and the control group ( $P < 0.01$ ).

**Table II. Students' Learning Evaluation Table of Computer Basis Public Course in Lanzhou Vocational College under Different Teaching Modes**

DEAL WITH CLASS	MAJOR AND CLASS	MASTERY OF THEORETICAL KNOWLEDGE (SCORE)	OPERATIONAL AND ANALYTICAL ABILITY (SCORE)	IMPROVE LEARNING EFFICIENCY (SCORE)	SELF-STUDY ABILITY (SCORE)	INNOVATIVE THINKING (SCORE)	TAKE THE INITIATIVE TO SHARE OPINIONS (SCORE)	AVERAGE (SCORE)
OBSERVATION GROUP	A <sub>1</sub>	96	99	97	90	94	92	94.7
	B <sub>2</sub>	98	95	95	90	89	94	93.5
	C <sub>1</sub>	93	98	99	92	91	97	95.0
	Average	95.7±2.5 <sup>aa</sup>	97.3±2.1 <sup>aa</sup>	97.0±2.1 <sup>aa</sup>	90.7±1.2 <sup>aa</sup>	91.3±2.5 <sup>aa</sup>	94.3±1.7 <sup>aa</sup>	94.2±1.3 <sup>aa</sup>
CONTROL GROUP	A <sub>2</sub>	90	88	92	82	84	86	87.0
	B <sub>1</sub>	88	92	91	90	87	90	89.7
	C <sub>2</sub>	91	91	94	87	82	88	88.8
	Average	89.7±1.5 <sup>ba</sup>	90.3±2.1 <sup>ba</sup>	92.3±2.1 <sup>bb</sup>	86.3±4.0 <sup>aa</sup>	84.3±2.5 <sup>ba</sup>	88.0±2.0 <sup>ba</sup>	88.5±1.4 <sup>ba</sup>

Note: Different capital letters in the same column indicate significant difference ( $P < 0.01$ ), and different lowercase letters indicate significant difference ( $P < 0.05$ ).

#### 4.5 Influence of “Two Courses and One Micro” Mixed Teaching Mode on Students' Examination Results

Table III shows that there are 28 people with scores above 90 in the observation group A1, B2 and C1, accounting for 23.14% of the total number, and 17 people with scores above 90 in the control group A2, B1 and C2, accounting for 13.82% of the total number. The total number of 80-89 scores and 70-79 scores in the observation group was 34 and 42 respectively, which increased by 36.00% and 2.43% compared with 25 and 41 scores in the control group respectively. The total number of people with 60-69 points and below 60 points in the observation group was 16 and 1 respectively, which decreased by 55.56% and 75% compared with 36 and 5 in the control group. The average analysis showed that the number of people with scores above 90, 80-89 and 70-79 in the observation group was 9.3, 11.3 and 14.0 respectively, which were higher than 5.7, 8.3 and 13.7 in the control group, while the number of people with scores below 60-69 and 60 were 5.3 and 0.3 respectively, which were lower than 12.0 and 1.7 in the control group. The results of analysis of variance showed that there was no significant difference between the observation group and the control group ( $P > 0.05$ ), significant difference between the observation group and the control group ( $P < 0.05$ ), and significant difference between the observation group and the control group ( $P < 0.05$ ), and significant difference between the observation group and the control group ( $P < 0.01$ ).

**TABLE III. The Influence of the Mixed Teaching Mode of “Two Courses and one Micro” on Students’ Test Scores**

DEAL WITH	CLASS	MORE THAN 90 SCORES	80-89 SCORES	70-79 SCORES	60-69 SCORES	UNDER 60 SCORES
OBSERVATION GROUP (121 people)	A1(44 people )	11	14	15	4	0
	B2(40 people )	10	11	13	6	0
	C1(37 people)	7	9	14	6	1
	Average	9.3±2.1 <sup>aA</sup>	11.3±2.5 <sup>aA</sup>	14.0±1.0 <sup>aA</sup>	5.3±1.2 <sup>bA</sup>	0.3±0.6 <sup>aA</sup>
CONTROL GROUP (123 people)	A <sub>2</sub> (43 people)	7	10	13	12	2
	B <sub>1</sub> (41 people)	6	8	15	11	1
	C <sub>2</sub> (39 people)	4	7	13	13	2
	Average	5.7±1.5 <sup>bB</sup>	8.3±1.5 <sup>bA</sup>	13.7±1.2 <sup>aA</sup>	12.0±1.0 <sup>aA</sup>	1.7±0.6 <sup>aA</sup>

Note: Different capital letters in the same column indicate significant difference ( $P < 0.01$ ), and different lowercase letters indicate significant difference ( $P < 0.05$ ).

## V. DISCUSS

Since 2013, many educators have studied the new teaching mode of computer foundation course. For example, Chengliang Liu [6] has conducted an empirical study on the teaching mode of computer foundation course in higher vocational colleges based on MOOC + FCM, and summarized the MOOC + FCM teaching process, effective organization methods and control strategies of teaching activities; Lichun Wu [7] constructed the basic process of six stages of flip classroom based on MOOC + SPOC in the research of teaching reform of basic computer courses in universities based on MOOC + SPOC, At the same time, it puts forward the problem that it is difficult to implement flip classroom teaching in view of the problem of large class size, and uses the new teaching mode of group learning method to improve students' learning interest and computer application ability; Nana He [8] introduced micro-class and rain classroom wisdom teaching tools in the research of mixed teaching reform of "Computer Foundation" course based on CDIO, and put forward a new mixed teaching mode; Zheng Zhou [9], Pengfei Li [10] and Haixia Sun [11] all made qualitative analysis on the application of Micro-Class in the teaching of Computer Foundation in the era of "Internet +", and did not rise to quantitative analysis; Hua Zhou [12] et al. put forward a mixed teaching reform model based on "MOOC + SPOC + Flip Classroom" focusing on improving students' application ability; Nana He [13] integrated CDIO concept into the teaching process of Computer Foundation, At the same time, this paper introduces the intelligent teaching tools of micro-class and rain class, and puts forward a new mixed teaching mode. However, the mixed teaching mode of "two courses and one micro", which is explored for the first time in the teaching process of Computer Foundation in higher vocational colleges, is superior to the existing teaching mode in teaching effect and learning effect. In higher vocational colleges in Lanzhou City, Gansu Province, Computer Basis is a compulsory public course for every major student, Computer teachers are in short supply, Especially in higher vocational colleges, such as Lanzhou Vocational Technical College, the workload of each teacher is more than 324 hours per semester. If teaching reform is not carried out and traditional teaching mode is adopted, students' enthusiasm, initiative and creativity can't be well mobilized, and the students' self-study ability, learning efficiency and comprehensive ability are poor. In this paper, through the face-to-face traditional multimedia teaching mode and the "two courses and one micro" compound teaching mode, the results show that the compound teaching mode of "two courses and one micro" has a significant impact on students' learning effect and improves students' comprehensive ability. Class 191 of hotel management as an observation group, The average evaluation score of 187 classes of preschool education and 191 classes of wedding service and management is 94.2, Compared with the control group, the average evaluation scores of 192 classes of tourism service and management, 192 classes of hotel management and 188 classes

of preschool education are significantly increased by 5.7 points, and the number of people with scores above 90 and 80-89 in the observation group is significantly increased by 63.15% and 36.14% compared with the control group. Therefore, the mixed teaching mode of “two courses and one micro” has remarkable learning effect.

## **VI. CONCLUSION**

Under the “Internet +” environment, The mixed teaching mode of “two courses and one micro”, which is Micro-Class + MOOC + WeChat, can not only realize one-to-one communication between teachers and students, Targeted personalized counseling for students, It is also convenient for students to communicate with teachers more conveniently through this platform, Especially through WeChat sharing function, Upload your doubts, opinions, homework and innovations to the class WeChat group through mobile phones for answers, comments and discussions, which not only encourages students who finish their homework seriously and are innovative, but also urges other unfinished students to set a benchmark and example for students, forming a point-to-many and many-to-many collective communication; Especially, this teaching mode transcends the restriction of space and time of traditional teaching mode, It can not only give full play to the leading role of teachers in inspiring, guiding and supervising, But also can fully reflect the creativity of students as the main body, Effectively prolonging students' study time, Meet the individualized needs of students to the maximum extent, It is beneficial for students to plan their study time according to their own needs, thus stimulating their interest in learning, improving their learning initiative and students' course learning effect, being more conducive to the interaction between teachers and students, and creating a new type of teacher-student relationship of equality and mutual assistance between teachers and students, which is worth popularizing in the teaching of Computer Foundation in higher vocational colleges.

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Research on the Development of Textbook System of “Integration of Courses and Certificates” Based on “1 + X” Certificate System under the Background of “Three Religions” Reform (2020XY-16).

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