Practice of “Internet +” in Biology Teaching

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Abstract. The digital teaching resources represented by MOOCs (Massive Open Online Courses) have great potential to subvert traditional classrooms. Excessive digital teaching cannot promote teaching effectively. Hence, the Internet is used as a medium in this paper to analyze the advantages and disadvantages of online learning of the MOOC platform and the classroom teaching comprehensively. The principle of complementary advantages is adopted to explore the establishment and application of teaching mode for biology teaching courses. In specific practice, the online teaching contents of the online platform account for 35%. The feedback information after one round of application suggests that the teaching effect of mixed courses is good, and students are generally willing to accept the mixed course teaching mode.

Keywords: Food Microbiology, Internet +, Mixed Course Teaching Mode

1. Introduction
Currently, digital teaching resources represented by MOOCs (Massive Open Online Courses) have the potential to overturn traditional classrooms. However, excessive digital teaching cannot effectively reverse the essence of receptive learning. A large amount of information about MOOCs leaves the students with no time to think and explore [1]. The industry believes that “Internet +” refers to the use of Internet platforms and information and communication technologies to combine the Internet with various industries, including traditional industries, to create a new ecology in new fields [2]. The concept of education informatization was put forward in the 1990s. With the development of education concepts and the continuous innovation of information technology, this concept is constantly updated and improved. Its essence is to use modern information technology and modern education theory to build an environment based on information where learners can access information and train talents [3]. The rapid development of education informatization benefits from the realization of the mobile Internet, especially the high-speed mobile network with higher-quality graphics, video, and file transmission speed. MOOCs were first proposed as a concept of large-scale open online courses in 2008. Until 2012, MOOCs developed rapidly. The New York Times referred to this year as the first year of MOOC. Many universities, institutions, and teachers from all over the world have successively invested in the construction and research of the MOOCs platform. As of February 2014, there had been more than 600 online courses on the Coursera platform alone, with 6.58 million registered students from nearly 200 countries. In 2014, domestic MOOCs platforms were launched
like mushrooms. Tsinghua University launched “School Online”; 87 domestic colleges and universities formed the “Course Sharing Alliance of Colleges in the East and West of China” to realize the sharing of high-quality educational resources: The injection of commercial capital gave birth to more resources. Many MOOC platforms are online, such as Wisdom Tree Online Education, NetEase Cloud Classroom, and MuKe.com. The spark of the MOOC platform that has integrated information technology with education and teaching is likely to set off the entire university classrooms and off-campus classrooms. The “flipped classroom” is not easy, nor can it be excluded or ignore the positive effects brought by modern means [4-5].

Therefore, in this paper, the Internet is used as a medium to analyze the advantages and disadvantages of MOOC platform online learning and classroom teaching comprehensively. The principle of complementary advantages is adopted to explore the construction and application of the teaching mode of biology teaching courses.

2. Construction of “Internet +” Course Teaching Mode

2.1. Theoretical design of the teaching mode of mixed courses

Firstly, the problem of the allocation of hours of face-to-face teaching and online teaching should be solved, i.e., the proportion of online teaching content. According to the proportion of online teaching content, it is considered that the online teaching rate reaches 30% -79%, which is a mixed course, more than 80% is an online course, and the ratio is within the range of 1% -29%, which is an online auxiliary course. In view of this, we should not only lead the overall situation but also refine the knowledge points to restructure the curriculum of traditional teaching. The specific implementation can be achieved through the syllabus and the restructured learning unit.

Secondly, it is necessary to guide students to study or preview in a targeted and active manner, and let students bring their own thoughts and critical thinking to the class. In the specific implementation process, the teacher can give a detailed learning schedule for the course, and there are practicable staged learning items and tasks, which can be discussed (online or in class), pre-class review, after-class review, self-study, related practice Presentation in the form of collaboration, etc. Specific issues and tasks can be academic frontiers, information related to knowledge points, as well as targeted tests, experimental operations, and observations.

Finally, tear-teaching teaching also requires complete curriculum design elements. In the early stage, it is necessary to analyze the current status of the curriculum, teaching objects, and learning environment. The specific curriculum design content mainly includes teaching objectives, teaching content, teaching resources, teaching activities, teaching evaluation, and rationally arrange face-to-face teaching and online teaching according to the characteristics of the teaching content.

2.2. Establishment of teaching mode for food microbiology mixed courses

The research object of this paper is biology. To make the mixed curriculum effective, the mixed food microbiology teaching for the first time in the second semester of 2017-2018 was selected for analysis. Before launching the mixed course teaching, teachers showed the structure, content, and specific usage of the online platform online and asked students to complete the “pre-class questionnaire” for the mixed course teaching (Fig 1).

The results of the pre-class questionnaire showed that 95.2% of students had easy-to-carry online platform learning tools. Most students still preferred network-assisted teaching mode, where 72.7% of students preferred the “30% classroom teaching + 70% online and autonomous learning” model, 13.6% of students preferred the “50% classroom teaching + 50% online learning” model, and 4.6% of students prefer the “70% classroom teaching + 30% online and autonomous learning” model, only 9.1% of students supported the “100% classroom teaching” model. The factors that help to develop students' imagination and creativity are not a single teacher's explanation (accounting for 23.3%) or students' extracurricular autonomous learning (accounting for 23.3%), but a discussion between teachers and
students (accounting for 33.3%) and extensive extracurricular reading (53.3%). In addition, 62.8% of students believed that active learning was mainly affected by personal factors (personal aspirations, world outlook, values, etc.), and 37.2% of students believed that the motivation for active learning came from teachers’ guidance and high-quality learning resources. The pre-class questionnaire survey is of important guiding significance for the course construction. During the implementation of the food microbiology mixed curriculum, it is necessary to pay attention to the following two issues: Firstly, we should improve the quality of teaching, pay attention to the potential autonomous learning ability of students, and give play to the role of teachers as guidance and guidance. Secondly, we should establish a good discussion and collaboration platform between teachers and students, based on the MOOCs teaching platform to provide students with a large number of useful learning resources and learning guide, thereby achieving intuitive and useful communication and collaboration in classrooms and laboratories.

Figure 1. “Internet+” Course

3. Application of “Internet +” Microbiology Teaching mode
The food microbiology sticking course is guided by unit navigation. The course contents are arranged in a close and orderly manner and has various forms. There are independent learning and teacher explanations. Learning resources include PPT, videos, scientific and technological literature. There are theoretical learning and practical applications (self-learning test, experiment design). Each task has a time limit, in addition to autonomous learning, followed by classroom teaching, which mostly solves the problem of poor student self-control and dishonesty. The fourth chapter self-study test submission rate is 100%, the literature reading submission rate is 100%, the experimental design plan submission rate is 90.2% on time, and the total excellent design rate of the experimental design plan is 80.5%. Through this teaching mode of speaking and speaking, students can carry out autonomous learning purposefully and be adequately trained in practical application.

The food microbiology mixed course was applied for the first time. Due to the influence of the traditional teaching mode and students’ limited access to the campus network, the actual online teaching content reached 35%, which met the standard of mixed courses defined by the Sloan report. Course assessment is based on interactive discussions (including attendance) at 15%, autonomous learning at 20%, expanded reading and effective collaboration at 150%, and roll-tested at 50%. The passing rate of the course assessment is 100%, the excellent (85-100 points) rate reaches 24.3%, and the excellence (75-84 points) rate is 68.4%.

The results of the course assessment and the results of the questionnaire survey after the end of the
course (see Table 1) show that the introduction of the online learning model is quite successful, and most students have a good grasp of basic knowledge, basic theory, and necessary skills. In the self-learning process of the network platform, students have more thoughts on knowledge, brought questions into the classroom, mobilized the enthusiasm and initiative of students, and facilitated to grasp the key and difficult knowledge points (Questions 3 and 5 on the question). Teachers' recognition of students' learning process is more conducive to improving the attention of students to the curriculum and learning effects (questions 4 and 6). At the same time, students generally responded to this course and improved their ability to retrieve and read related scientific and technical literature.

**Table 1. Questionnaire survey results after the course**

| Serial number | Problem                                                                 | Option  | Proportion (%) |
|---------------|------------------------------------------------------------------------|---------|---------------|
| 1             | Did the introduction of the online course on microbiology this semester stimulate your enthusiasm for learning? | Yes     | 76.9          |
| 2             | Do you want to learn independently according to the course navigation? | Yes     | 51.6          |
| 3             | Does self-paced online learning encourage you to participate in class discussions actively? | Certain effect | 21.1        |
| 4             | Do you think that focusing on the classroom's usual classroom interaction can help improve learning? | Yes     | 100           |
| 5             | Do online courses help you review and apply what you have learned?     | Yes     | 86.5          |
| 6             | Does the usual assessment of the course help increase the focus on the course? | Yes     | 96.2          |

The following evaluations for classroom teaching are made:

Assuming there is a multi-index evaluation system consisting of n evaluated objects $u_i, u_2, \cdots, u_n$ with m indicators $x_{ij}, j = 1, 2, \cdots, m$ is the observation data evaluation data matrix (decision matrix) of the evaluated object $u_i$ and the index $x_j$ can be expressed as shown in formula (1):

$$
A = \begin{bmatrix}
    x_{11} & x_{12} & \cdots & x_{1m} \\
    x_{21} & x_{22} & \cdots & x_{2m} \\
    \vdots & \vdots & \ddots & \vdots \\
    x_{n1} & x_{n2} & \cdots & x_{nm}
\end{bmatrix}
$$

(1)

Where the data in $m, n \geq 3$ and $A$ are normalized data after preprocessing.

It can be transformed into equation (2) as follows:

$$
y_i = f(x_{i1}, x_{i2}, \cdots, x_{in}), i \in N
$$

(2)

Where $f$ represents a positive transformation function; $y_i$ represents the comprehensive
evaluation value of the evaluated object \( u_i, u_i, u_2, \cdots, u_n \) are sorted according to the values of \( y_1, y_2, \cdots, y_n \) in descending order, and the comparison of \( u_i, u_2, \cdots, u_n \) is completed.

If there are two evaluation objects \( u'_i, u'_n (i', i'' \in N, i' \neq i'') \), let \( w_j(i', i'') \) be a random variable that obeys a distribution on the interval \( [\min(w_{j1}, w_{j2}), \max(w_{j1}, w_{j2})] \), and call \( s(u'_i > u'_n) \) the superiority of \( u'_i \) to \( u'_n \), as shown in equation (3):

\[
s(u'_i > u'_n) = p(f(u'_i) > f(u'_n)) + 0.5p(f(u'_i) = f(u'_n))
\]

(3)

Where the aggregate function represents the event probability, as shown in formulas (4) and (5):

\[
f(u'_i) = \sum_{j=1}^{m} z'_j w'_j(i', i'')
\]

(4)

\[
f(u'_n) = \sum_{j=1}^{m} z'_j w'_j(i', i'')
\]

(5)

4. Conclusions
In conclusion, based on the Internet, 35% of online autonomous learning is introduced to the teaching of food microbiology courses, where classroom teaching does not adopt the traditional form of cramming education by teachers. The autonomous learning is combined, and more interactive discussion time is added, focusing on the learning process assessment of students. This change has been generally recognized by the students. From the survey results after the course, although the students completed self-study tasks, including reading books and courseware, completing test questions, and reading literature, the systematic learning proportion was only 51.6%, which suggested that there were still issues of dishonesty during online learning of this course.

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