The Application of Cloud Class in the Teaching of Biochemistry

Naxin Sun*, Yuanxiu Wang and Yuehui Liu
School of biological science and technology, University of Jinan, Jinan, China

*Corresponding author: chm_sunnx@ujn.edu.com

Abstract. Interactive cloud class platform assisted instruction is an important supplement of classroom teaching, and it is becoming one of the important forms of new teaching methods. Biochemistry is the most important specialized basic course for biotechnology students, and it is also considered one of the hardest subjects among the curriculum. The current work explores the application of the cloud class in the teaching of the theoretical biochemistry courses. Practical research shows that the application of the cloud class teaching platform can effectively motivate students’ learning potential to the greatest extent. With this tool, teachers and students have come to get keenly a sense of the kind of creativity and advancement of information-based teaching, and the blended learning integrated face-to-face instruction and online teaching provides a new way and method in higher education teaching reforming.

Keywords: Cloud class, biochemistry, network teaching platform.

1. Introduction
The Ten-year Development Plan for Education Informatization (2011-2020) issued by the state emphasizes the deep integration of information technology and higher education, and the acceleration of education informatization construction, so as to give full play to the supporting and leading role of information-based education in education reform and development [1]. Pursuant to the document spirit of the ministry of education, to remain synchronized with changes to the times and help revitalize teachers and students, based on the current education situation of the School of Biological science and technology, biochemistry has been selected as the pilot course of the application of interactive cloud class teaching platform. As biochemistry is considered one of the most important and difficult subjects in the curriculum, a good and effective method of teaching biochemistry can enhance the student’s academic performance and establish their understanding and interest in this major. It also helps the students to retain and apply the knowledge gained in the subject for other follow-up professional courses.

However, despite the importance of biochemistry, researches over the years still have demonstrated a number of problems encountered in learning of biochemistry [2]. Due to the complex system of biochemistry, there are numerous concepts and disciplines involved to memorize and understand, which exerts much pressure on the students. For this reason, it is a must to improve and develop the quality of interactive teaching and learning by using modern network technology. The interactive cloud class, one of the widely used network teaching platforms, has gained superiority and potential
2. Problems and solutions in biochemistry course teaching

The teaching learning method of biochemistry courses has commonly based on traditional lectures with support of modern audio-visual aids. In the PowerPoint presentation, topics can be explained with lively images and videos which helps to attract the students' attention and to stimulate their study interest. Notwithstanding all this, the teacher-centered form of teaching is still far from satisfactory which ignores students’ subjective initiative and is not conductive to stimulating their potential. Besides, the lack of formative evaluation of learning fails to establish an effective supervision to urge students to complete their tasks in time and to solve the problems encountered by students in a timely manner, which can easily make students lose interest in learning and thus lose enthusiasm for learning.

In recent years, educational reform in colleges and universities has been steadily led onto the correct path. It advocates to enforce and perfect the support serving system to "take students as a center" and education management in open education [3], and students should change from accepting passively to accommodating actively. Therefore, various teaching models have been accordingly put forward for improving the efficiency and quality of teaching and learning, such as objective-based teaching method, experience training method, project-based teaching, and case method [4-5]. Meanwhile, with the development of cloud computing technology and the overall information construction of education, the deep integration of modern technology and teaching has also become inevitably in trend of educational reform [6]. In order to meet the requirements, the mobile information learning platform combined with multimedia to mixed design is used in biochemistry course teaching.

Blue ink cloud class, mainly based on smart phones and tablets as a terminal tool, can be used as the network construction of teaching resources platform. Teachers in any mobile device or computer can easily manage all kinds of teaching items concerned, such as issuing notifications, sharing learning resources, assigning and correcting homework, managing group discussion, answering students’ questions, giving quizzes in class or after school and so on. With the help of the platform, it is convenient to realize teaching interaction with immediate feedback communication and to strengthen the teaching interaction between the teacher and student, thus effectively promoting the conduct and control of the teaching activities.

3. Practice of cloud class auxiliary teaching mode

All manuscripts must be in English, also the table and figure texts, otherwise we cannot publish your paper. Please keep a second copy of your manuscript in your office.

When receiving the paper, we assume that the corresponding authors grant us the copyright to use the paper for the book or journal in question. Should authors use tables or figures from other Publications, they must ask the corresponding publishers to grant them the right to publish this material in their paper.

3.1. Check course materials in time

Learning materials are provided for students on the cloud class platform, so that each student can get assistance from the materials and more importantly teachers can look through the study situation of students. Relevant courseware, syllabus, course arrangement and other course materials as well as video materials are uploaded to the cloud class in accordance with chapter section order, and the students are asked to arrange their own study plan according to their needs and priorities outside the classroom. So after class they can participate in all kinds of study activities on the platform including the course of discussion, brainstorming, trying self-test and questionnaire, raising or answering questions with others irrespective of geographical barriers. It is also convenient for teachers to
examine students’ progress, for the situation of every student is displayed in a chart form and those who rarely studied would be informed to teachers once a week to draw special attention. In general, we teachers would remind timely those students of learning materials by individual messages, for it is important to ensure that students are under careful support and attention.

3.2. Make class attendance inspiring as well as fun
Taking attendance in class is the common ways used by teachers to manage effectively students’ behavior in the classroom. However, with the expansion of college enrollments, many classrooms are overcrowded, making it difficult for teachers monitor class attendance and easy for students to skip class. Now we can easily implement the task with the help of cloud class and statistics on attendance of the semester can be displayed openly by a summary table (shown in Fig.1). Teachers get into the attendance system as soon as the bell for class runs. There are three types of check-in methods to choose from, and the instant result for attendance can be projected on the screen. In this way, it takes less than 30 seconds to complete the roll call for classes with 70 or so students. Check-in in this way not only saves time, suites teacher's convenience to check out the absentees, but more importantly helps activate the classroom, improves the teaching efficiency of the classroom.

3.3. Attract attention to formative evaluation
The attendance system on cloud class does contribute to the rise in the number of students attending class, but there are a number of things else to do to ensure the co-relation between attendance and performance in a course. To guarantee the smooth completion of learning tasks, we carry out formative evaluation of biochemistry teaching and conduct the evaluation in the educational activities in cloud class. The evaluation items include various of quizzes before class, in-class and after class and online assignments, online stage examinations and other activities such as thematic discussion and questionnaire survey. Among the above activities, the real-time quiz (shown in Fig. 2) is undoubtedly one of the most impactful measures owing to students’ scores and their rankings publicly displayed on the projection screen. As shown in Fig. 3, when tests are finished within the given time, the scores will be automatically counted and ranked on the screen. This is a very strong stimulus for students. Meanwhile, it is a powerful opportunity for teachers to provide the overall completion analysis and to adjust our teaching pace based on the students' needs through assessing the learning status of students in time (shown in Fig. 4). These various of teaching activities can all mobilize the enthusiasm and engagement of students effectively so as to help establish a good understanding of theoretical knowledge, which is particularly suited for classes with a large number of students.

3.4. Help reserved students “speak out”
Nowadays the application of the mobile platform has changed silent students’ modes in a class to a great extent. In the traditional teaching, it was rather awkward that students used to rarely respond to inquiries or questions from teachers, though they may have problems or know the answers. However, thanks to information technology, the above behaviors would improve using the voting/questionnaire function of cloud class in biochemistry class. Surveys about key items of biochemistry are drew up once a week or so, according to the content, and students are asked to complete the questionnaire or vote. Almost all students respond positively to the surveys, so teachers have a better sense and observation of all students and would make subject matter accessible to all students. In general, conducting surveys is a good way to stay in touch with students and increase participation with all students.

3.5. Give students tangible evaluation criteria
It is necessary for students to know a clear and definite score system at the beginning of the term. The traditional “one volume” examination model at the end of the term neglects to manage the study at ordinary times, and it also ignores to develop the activeness and the creativity of students throughout the whole semester. On the first-course of the biochemistry course, the students are informed that the
total curriculum scores are divided into two sections, the formative evaluation and the final examination, and scores of the former would account for 40%. In the course, weights are set for various items such as students' courseware learning, video learning, check-in, class performance, quiz scores, brainstorming, etc., and each student acquire a dynamic score automatically generated by his or her learning activities, which is called “the experienced value”. The activity in learning is motivated with the competition of the score, students learn textbooks and a large number of reference materials carefully in their spare time, and discuss openly with others. Using this kind of compound assessments, teachers can conveniently gain multidimensional process evaluation of students, and evaluate students' learning effect in the whole semester more comprehensively and objectively, which can better promote students' learning at ordinary times.

![Check-in statistics (projection screen).](image1)

![Classroom on line test (projection screen).](image2)
4. Effect analysis and evaluation
Based on the cloud class in biochemistry teaching, the implementation of 2019 undergraduate students majoring in biotechnology in our school was conducted. At each end of the semester, a feedback about the teaching method was conducted to a survey of all the 72 students in two administrative classes by means of the questionnaire in the cloud class. The effect was examined three-dimensionally, that was the students' acceptance of the new teaching mode, the influence of self-learning ability, and the effect of learning initiative. Results from the survey showed that 75% of students have a high acceptance of this learning mode, while 80% of the students think that they improve their self-control ability, arranging their learning time flexibly under this teaching mode, and 68% of the students believe that they can take the initiative to learn under this teaching mode; however, only 9% of the students are not sure whether their learning ability has been improved, and only 12% of the students deny that their self-learning ability has been improved.

In the questionnaire, most of the students reported that it is a rewarding attempt to simulate their interests and self-discipline in learning. Some even gave high marks to the new teaching mode, who...
warmly made commons like that “The lectures are no longer dry and boring, and I am never sleepy in class as before.”, and that “I am pleased to turn positive attitudes to learning this semester, for I used to be the weak student.” We teachers are gratified to find that most students love the change based on cloud class when we read the response from some student who wrote that “I am surprised to see that I can learn well in class and communicate with others, starting from biochemistry but more of biochemistry. Thank you, my biochemistry teachers.”

5. Conclusions
Based on the cloud class teaching platform, the teaching of biochemistry is taken as an example to research the interactive ways and methods with the help of smart phone, computer, and other related auxiliary tools. The practical application shows that the interactive teaching is more involvement, more depth in the subject compared to traditional teaching. The teachers accept feedback from students from time to time, and students can keep in touch with teachers and classmates, which effectively enhances their interest, enthusiasm, and initiative in learning. With the development of digitizing teaching management, the online course platform of cloud class, which is favorable to both teaching and studying, will be gained more widely acceptable and applicable.

References
[1] Cheng Xu, “Application of Interactive Cloud Class Teaching Platform in “Embedded System” Course,” Region - Educational Research and Reviews, vol. 2, pp. 1-5, March 2020.
[2] LH Bian, YJ Lang, GL Ren, ZH Zhai, “The Application and Experience of WeChat Enterprise in the Teaching of Biochemistry Course,” 2018 International Conference on Education, Management and Social Science (EMSS 2018), pp. 19-25, 2018.
[3] S Bera, “Enhancing Quality of Teaching Learning by Using Information and Communication Technology (ICT),” Scholarly Research Journal for Interdisciplinary Studies, vol. 3, pp. 100-112, September 2020
[4] B Eguabor, AM Adeleke, “Investigating Differential Learning Outcomes of Students in Physics Using Animation and Textual Information Teaching Strategies in Ondo State Secondary School,” European Journal of Sustainable Development Research, vol. 2, pp. 10-16, June 2017.
[5] Sajeevan K. C, Jaya Jose, “Level of Knowledge Gained by Self-Directed Learning and Interactive Lectures for Teaching Biochemistry among First Year Medical Students in Government Medical College, Idukki, Kerala- A Comparative Study,” J. Evid. Based Med. Heathc, vol. 5, pp. 1395-1398, April 2018.
[6] YJ Luo, Y Li, ML Liu, Y Long, DN Chen, “Reform and Application of Biochemistry Teaching Based on Formative Evaluation of Mobile Network Platform,” Journal of Physics: Conference Series, pp. 1-6, July 2020.