European Proceedings of
Educational Sciences
EpES

www.europeanproceedings.com

e-ISSN: 2672-815X

DOI: 10.15405/epes.23056.24

ERD 2022
Education, Reflection, Development

EXPERIENCE OF LEARNING PRACTICE BASED ON "BYOD+ PLIPPED CLASSROOM"

Cheng Li (a,b)*, Zhu Jin (a,b), He Xiaohui (b), Zhu Li (b)
*Corresponding author

(a) School of geography and tourism, Shaanxi Normal University, 620 West Chang 'an Street, Xian, China, chengli527@126.com
(b) College of Resources and Environment, Baotou Teachers College, 3 Science Road, Baotou, China, chengli@bttc.edu.cn

Abstract

Students from two classes of the ISEC program at Baotou Normal University participated in a general education course in environmental science and technology called "BYOD+ Flipped Classroom". Course content is mainly pushed by the platform of Blue Moyun class. Students use their own devices (smart phones) to participate in online learning and interaction of the course. The teaching team uses the mixed method of "BYOD+ flipped classroom" for teaching design and implementation. Student questionnaires show that students' knowledge has expanded, survey and other curriculum activities have increased, and their grades have improved. The data of group interview shows that students have a good learning experience of this learning mode and a positive view of the teaching mode of "BYOD+ Flipped classroom". The average score of students who implemented the "BYOD+ flipped classroom" hybrid teaching method was 85.18% (2017), while the average score of students who implemented the traditional teaching method was 81.39% (2016). In 2017, the average course evaluation score of "BYOD+ Flipped Classroom" students was 96.8/100, compared with 93.74/100 under the previous traditional teaching model. It can be seen from the group interview that, first of all, students have obtained a better learning experience, and secondly, students' attitude towards the ecological environment has changed.

Keywords: BYOD, Blended learning, Curriculum design, Flipped Classroom, Mosoteach APP

https://doi.org/10.15405/epes.23056.24
Corresponding Author: CHENG Li
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2672-815X

1. Background

In recent years, with the development of the Internet and information technology and the popularity of smart phones, schools around the world are facing challenges brought by the development of modern technology. These new technologies and new means are increasingly becoming tools to support the learning process and are applied to teaching. There are also more and more attempts to Bring Your Own Device (BYOD) mode based on students' personal smart phon（Cochrane et al., 2014）. Many scholars believe that the wide application of new technologies in the teaching process is a milestone, which will improve students' learning outcomes and enhance students' ability to acquire digital information (Szabo et al., 2021). However, some scholars are concerned about the limitations of standardized models behind these apps and even their imposition on school education Many studies have shown that both teachers and students appreciate the application of new educational technologies in daily teaching (Gopal et al., 2021), which promotes students' personalized learning and communication and cooperation among students.

In early online education, due to the slow Internet speed and lack of real-time interactive support tools, teacher-student and student-student communication and interaction were limited, and the inability to get teachers' feedback and peer response became the main drawback of online education at that time. Research has shown that face-to-face students have more positive perceptions of these learning environment characteristics than online students. Students who take in-person classes can more easily meet at least once a week to discuss class projects for longer periods of time, resolve any differences of opinion, and build social relationships, suggesting that online environments may lack the strong social dimensions that favor in-person classroom experiences. Broadband speed up and the rapid development of smart phones and online learning platforms have greatly improved this disadvantage, especially the popularity of smart phones among young people in China, relying on smart phones to achieve teacher-student and student-student interaction in class becomes possible. At the same time, research also shows that there is no difference in learning outcomes between the two course formats, and online learning can be just as effective in many ways as face-to-face learning, which supports the continued development of online learning programs. Further efforts are needed to improve overall student/faculty communication, particularly with regard to teacher feedback and student progress. This will require identifying and implementing new communication strategies in order to facilitate communication between students/teachers at appropriate stages of the curriculum.

In addition to the popularity of personal devices such as smart phones and the development of broadband network, we also face the serious situation that students play with mobile phones in class. And the contradiction between the rising cost of education, the compression of class hours and the improvement of teaching quality. There is an urgent need for innovative ways to harness emerging technologies to foster positive learning experiences and make more effective use of student and faculty time.

As a general course, environmental science and Technology pays more attention to the breadth of knowledge in teaching, while in traditional teaching process, online education technology is used to deliver content and materials outside the classroom, which can free up classroom time and actively and

https://doi.org/10.15405/epes.23056.24
Corresponding Author: CHENG Li
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2672-815X

collaboratively apply content with the support of classmates and lecturers. This model aims to engage students independently in the material at their own time and pace, shift the emphasis from teachers to learners, and promote active learning and problem solving.

2. Conceptual Framework and Course Overview

2.1. Conceptual framework

BYOD (Bring Your Own Device) means that teachers and students Bring their personal smart mobile devices into the classroom and outside of the classroom, and use them as teaching and learning tools to obtain teaching resources, carry out teaching activities, and realize teaching interaction to improve teaching efficiency and optimize teaching effects (Pozo Sánchez et al., 2020).

Flipped classroom refers to the reversal of the traditional learning process, allowing learners to complete independent learning of new knowledge points and concepts in extracurricular time. The classroom becomes a place for interaction between teachers and students, mainly used for answering doubts, reporting and discussing, so as to achieve better teaching effects (Brandon, 2020).

Blended Learning：According to the views of Garrison and Kanuka (2004), we define it as: Based on certain target of teaching and learning, the advantages of the traditional face-to-face teaching study and combine the advantages of online collaborative learning, using appropriate technology, at the right time pass appropriate learning content to the appropriate learner, give full play to teachers' leading role and students' main body status, in order to realize the teaching optimization. The "BYOD+ flipped classroom" teaching we tried belongs to mixed teaching.

2.2. Course overview

The international InternationalScholarly Exchange Curriculum (ISEC) of baotou normal university is an international cooperative project for some domestic undergraduate schools. The ISEC program has the following eight teaching features:

i. Teaching based on Learning Outcomes
ii. The evaluation method based on process learning is adopted.
iii. Attach importance to the application of critical thinking in teaching
iv. Guide students to study actively
v. Create an environment for cultivating international talents
vi. To provide international teaching quality assurance system.
vii. Focus on the construction of professional characteristics

From the above characteristics, we can see that the teaching characteristics of ISEC are completely different from our traditional teaching characteristics, which subverts the traditional teaching concept. In terms of teaching methods, ISEC projects pay more attention to the application of various teaching methods to arouse students' enthusiasm. From the perspective of the teaching evaluation mechanism, it pays more attention to the teaching methods used by teachers in the teaching process, the process of supporting the development of students' skills, emphasizes the class hour, downplays the class hour, and attaches importance to each link of the learning process。From the form of students' learning, completely

https://doi.org/10.15405/epes.23056.24
Corresponding Author: CHENG Li
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2672-815X

change the inertia of passive exam-oriented learning, pay attention to stimulate learning potential, cultivate students' professional interest, pay attention to the importance of preview, thinking and questioning for students. ISEC projects pay more attention to the cultivation of students' Awareness of Chinese values, legal awareness, expression and communication ability, discernitive thinking ability, healthy living and aesthetic ability, learning and exploration ability, adaptability and cooperation ability and civic awareness. In order to achieve these goals, we must mobilize the enthusiasm of students, especially the participation, and at the same time, we must make efficient use of classroom teaching, adopt the teaching method of combining in and out of class, and complete the teaching objectives and teaching tasks. And how to use the limited classroom teaching time, efficient completion of teaching tasks, to achieve teaching objectives? Has been placed in front of ISEC teachers a difficult problem.

3. Course Design and Content Reconstruction

3.1. Course design

In this study, THE ISEC class was chosen as the object of teaching reform. Through reading literature, we can deeply understand the connotation and characteristics of BYOD, flipped classroom, blended teaching and other concepts. Learn relevant theoretical knowledge to guide practical research. Through the use of questionnaire, observation and interview method to understand students' acceptance of the new teaching form, and based on this to write the teaching syllabus, teaching design. The specific process is as follows, see Figure 1:

Like any other teaching design model, the design of hybrid learning activity system also begins with activity demand analysis, including learning environment analysis (online learning environment and classroom learning environment), learning task analysis and learner characteristics analysis.

On the basis of demand analysis and according to the teaching concept of ISEC, the teaching content of the new syllabus of Environmental Science and Technology should be appropriately specialized or modularized. Then design teaching activities according to the characteristics of different topics and teaching objectives. In the teaching process, the learning activities are adjusted and controlled by using the statistical analysis function of big data of Lanmoyun class. After modification and improvement, the hybrid teaching activity system design of "BYOD+ Flipped Classroom" is completed, and the course resource database is constructed.

The research on the application of hybrid teaching methods based on BYOD and "MOOC+ Flipped Classroom" is to organize teaching activities on the teaching platform of Mosoteach App on the basis of teachers and students' own devices under the background of mobile Internet. On the basis of demand analysis, the following contents are designed:

i. Design of Online learning activitys.Buy a way to design online learning activities. Make full use of the existing functions of Mosoteach APP to complete the design of notice release, resource upload, discussion and q&A, self-test before class, inductive feedback and other contents.
ii. Design of classroom learning activities. Based on the demand analysis of early learning activities. Each activity is designed according to the process of clarifying the purpose,

https://doi.org/10.15405/epes.23056.24
Corresponding Author: CHENG Li
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2672-815X

introducing the process, assigning tasks, implementing the activity and evaluating the activity. The activities often carried out in class include: vocabulary dictation (dictation of English words of key words in the course), group discussion, brainstorming, competition for quick answers, thematic debate, achievement presentation, interview, class summary, etc.

We used Mosoteach APP to upload course-related materials by type, including course-related materials in Word document format, e-books, PPT, related papers, related video materials, etc. On the teacher side, teachers can see the reading status and progress of each student and assign corresponding scores. Can assist teachers to timely understand the situation of students preview.

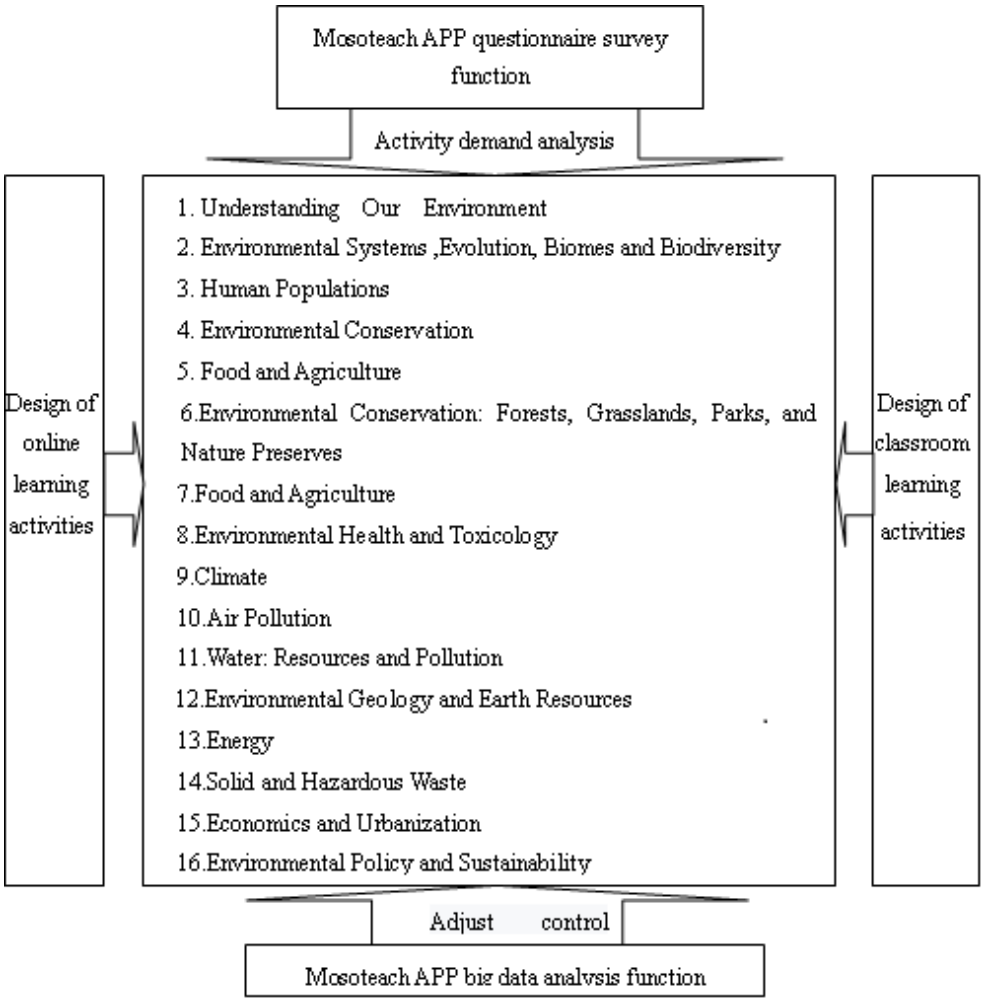

Figure 1. Environmental science and technology curriculum design and teaching content

3.2. Course reconstruction

On the basis of demand analysis and according to the teaching concept of ISEC, the project team members made appropriate monographic series or modularization of the teaching content of the new outline of Environmental Science and Technology (ISEC), and designed 5 activity themes, see Table 1: Darwin and evolution, genetically modified food debate, global warming in your eyes, environmental issues around you and urbanization and urban issues; And in the teaching practice implementation; According to the practice feedback, the teaching effect is good, basically reached the expectation.

https://doi.org/10.15405/epes.23056.24
Corresponding Author: CHENG Li
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2672-815X

However, in the team discussion, the team members pointed out that the course of Environmental Science and Technology focuses on environmental science, but our course activities, whether online or in class, are all based on the collection, sorting and discussion of network resources. Without practical experience, students' learning is disconnected from the reality of life. So we try to change the investigation report of "environmental problems around us" into field investigation -- environmental problems around us. The teaching format changed to field research, We required students to investigate the environmental problems around the school in groups, and report the investigation in real time in the course group by using the location sharing and video recording functions of wechat. Finally, we required students to report the investigation results in the form of PPT in groups. It was a successful attempt. In the feedback after class, the students thought that the combination of textbook knowledge with real life made them more interested in learning content. At the same time, they also found a lot of environmental problems and potential health hazards around them, and paid more attention to these problems.

Table 1. Teaching modules and cognitive goal

Modules	Curriculum resource	Activity	Cognitive Goal
Theory of evolution	Darwin and Evolution Was Darwin Wrong? Yes	brainstorming	Evaluating
Global warming in your eyes	The day after tomorrow	group discussion	synthesis
Do the advantages of GENETICALLY modified foods outweigh the disadvantages?	Use the Internet to find information	debate competition	Analyzing
Environmental problems around you	Google earth, GPS, smartphone, voice recorders, digital camera	field survey	Application
Urbanization and environment	Mega cities (New York, Mexico City, Hong Kong, Los Angeles, Las Vegas)	classroom discussion	comprehension

4. Evaluation and Analysis

4.1. Evaluation Methods

We used a hybrid approach to the assessment, including pre - and post-class surveys, comparison of overall course grades and test scores before and after the reform, and feedback from after-class group interviews. The survey before and after class mainly adopts questionnaire survey to understand students' understanding of some concepts, attitudes of some phenomena and understanding degree of some environmental problems, as well as their attitude of "BYOD+ flip" teaching mode. After class group interview is helpful to understand students' opinions more deeply, which is very convenient and appropriate for non-sensitive topics.

The questionnaire was designed and reviewed by three teachers in the research group, and was completed electronically one week before the beginning of the course. The after-class survey was also completed electronically one week after the end of the course.

We compared the course test scores of students before and after the implementation of "BYOD+ flipping" in 2016 (n=47) and 2017 (n=50). The exam consists of 25 multiple choice questions and five short answer questions, marked by the same teacher. The Mann-Whitney U test (5% significance level)

https://doi.org/10.15405/epes.23056.24
Corresponding Author: CHENG Li
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2672-815X

was used to assess whether there was a statistically significant difference between students' test scores in 2017 and 2016.

We conducted a 40-minute group interview after the last class. Qualitative data such as audio recordings were formed (reviewed and signed by the interview team members). The interview involved students' learning experience and their views on the "BYOD+ flip" teaching model. We analyzed and coded the interview data and summarized the themes from them.

4.2. Result Analysis

Student questionnaires show that students' knowledge has expanded, survey and other curriculum activities have increased, and their grades have improved. The data of group interview shows that students have a good learning experience of this learning mode and have positive views on the teaching mode of "BYOD+ Flipped classroom". In response to the question "Are you willing to choose the teaching mode of" BYOD+ Flipped Classroom "instead of the traditional classroom teaching mode in the future courses? 98% of the students agreed or strongly agreed. All students agreed or strongly agreed that "the 'BYOD+ Flipped classroom' teaching model is different from the traditional classroom teaching experience they received before". At the same time, students are very interested in the videos and documents pushed by Mosoteach APP platform, and the voting function and individual academic comprehensive evaluation function of the APP are also well received by most students.

The average score of students who implemented the "BYOD+ flipped classroom" hybrid teaching method was 85.18% (2017), while the average score of students who implemented the traditional teaching method was 81.39% (2016). In 2017, the average course evaluation score of "BYOD+ Flipped Classroom" students was 96.8/100, compared with 93.74/100 under the previous traditional teaching model. It can be seen from the group interviews that, first of all, students get better learning experience (for example, videos, animations and other course materials, interaction with teachers and classmates, etc.); The second is the change in students' attitude towards the ecological environment (for example, students are more interested in learning courses and show a strong interest in personal participation in sustainable development).

5. Discussion and Conclusion

This paper reports a teaching design and implementation for undergraduate general courses, namely "BYOD+ Flipped classroom" teaching mode. Our findings show that this innovative approach facilitated student learning and provided a positive learning experience for these 50 students. Students said they "prefer the new format, especially the APP's video was Darwin Wrong?" "It was the first time he saw the complete opposite of evolution, and it made him think about it." "Mostly teachers leave before class preview seriously have not completed, this course APP push resources teacher can see progress of our page, this to urge their watched all the video and documents, it is quite interesting, especially when discussing these questions in class, emerged a lot of thoughts in my mind." Of course, some students think that the Internet speed in the school dormitory is too slow, and there is some lag when watching the video. Students (92%) are more willing to choose the course of "BYOD+ Flipped classroom" teaching

https://doi.org/10.15405/epes.23056.24
Corresponding Author: CHENG Li
Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2672-815X

mode. Teachers also reported positive experiences in curriculum design, implementation and teaching effectiveness.

This model can be considered to be promoted in other general education courses in our school. The APP push function can well realize data push and process supervision, ensure that students can fully discuss and solve the problems raised by students within the limited time of classroom teaching, and also achieve a better display of group results.

Need to be aware of is "BYOD + roll class" teaching mode transferring teaching outside of the classroom, not just transfer is just one small part of the content, we are hoping to network platform and BYOD, with a "flip" the classroom, in the form of more time to the students, encourage them to become active learners, become the course controller, Promote their attention to higher level cognition, and promote their active participation in the course learning. The more important lesson for the success of blended teaching is to build a good relationship between face-to-face communication and online activities that can support each other, and the content should have good continuity. In the course design, we should pay attention to the effectiveness of activities, not only to have certain attraction, but also to guide students to reflect, maximize the use of classroom teaching time with students or promote face-to-face communication between students. Do a good job in teaching design, overcome the disadvantages and give full play to the rich resources of the platform, which is conducive to the development of students' personality, strong interaction between teachers and students, and improve teaching efficiency and teaching effect.

In today's higher education dominated by traditional teaching, although great progress has been made in educational technology and education innovation, this model is just starting and needs more research and practice. Our research results show that the teaching mode of "BYOD+ flipped classroom" has positive experience for both students and teachers in undergraduate general education. Our data show that the use of BYOD through the network teaching platform can achieve efficient transmission of teaching content, can also achieve the management and supervision of students' online learning activities to a certain extent, can promote the wider application of "BYOD+ flipped classroom" teaching mode in general education of colleges and universities.

Acknowledgments

This research was sponsored by the science and technology research project of colleges and universities of Inner Mongolia autonomous region (Grant No.NJZY20361) and Inner Mongolia autonomous region education science research "13th five-year plan" project (Grant No.NGJGH2019187) and Inner Mongolia University Innovation and entrepreneurship education scientific research project (Grant No. NMSCI18054).

References

Brandon, D. T. (2020). Unflipping the flipped classroom: balancing for maximum effect in minimum lead-time in online education. *Journal of Chemical Education, 97*(9). https://doi.org/10.1021/acs.jchemed.0c00795

Cochrane, T., Antonczak, L., Keegan, H., & Narayan, V. (2014). Riding the wave of byod: developing a framework for creative pedagogies. *Research in Learning Technology*, *22*. https://doi.org/10.3402/rlt.v22.24637

Garrison, D. R., & Kanuka, H. (2004). Blended learning: uncovering its transformative potential in higher education. *The Internet and Higher Education, 7*(2), 95-105. https://doi.org/10.1016/j.iheduc.2004.02.001

Gopal, R., Singh, V., & Aggarwal, A. (2021). Impact of online classes on the satisfaction and performance of students during the pandemic period of COVID 19. *Educ Inf Technol 26*, 6923–6947 (2021). https://doi.org/10.1007/s10639-021-10523-1

Pozo Sánchez, S., López-Belmonte, J., Moreno-Guerrero, A.-J., Sola Reche, J. M., & Fuentes Cabrera, A. (2020). Effect of Bring-Your-Own-Device Program on Flipped Learning in Higher Education Students. *Sustainability, 12*(9), 3729. https://doi.org/10.3390/su12093729

Szabo, C. M., Orsolya, B., & Nagy, B. (2021). The methods and it-tools used in higher education assessed in the characteristics and attitude of gen z. *Acta Polytechnica Hungarica, 18*(1), 121-140.