Teaching Reform of Python Language Online Learning by Introducing Deep Learning Concept

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Abstract: Blended learning is an organic combination of online learning and face-to-face teaching. Blended learning replaces the "watch videos and do homework" model of online learning with face-to-face communication. It is a big data era, but graduate students who willing to work on big data analysis research have no enough class hours to learn programming languages. In advanced artificial and business big data analysis etc. course, the course team introduces the deep learning concept, which not only solves the shortcomings of programming language learning such as few class hours and no practical sessions, but also emphasizes the importance of establishing a learning field and focuses on allowing students to shift from the learning of knowledge to the cultivation of interest and the ability to solve complex problems with computers. Practice shows that the mode has achieved better teaching effect.

Keywords: Blended Learning; Deep Learning; Pyrhon Language Teaching; MOOC.

1. Introduction

As Chinese Poetry said, "Suddenly like a night of spring breeze, thousands of trees and pear blossoms", along with the development of information technology and education technology, as well as the popularization of the lifelong learning desire, Massive Open Online Course (MOOC), the university without walls has sprung up one after another, bringing many new trends to people's learning[1]. In 2012, some world-class universities including Stanford University, Harvard University, and Massachusetts Institute of Technology unanimously set off MOOC teaching, and platformed such as Coursera, edX, and Udacity, which are called "troika". In 2013, Chinese universities such as Tsinghua University and Shanghai Jiaotong University join the three major platforms or develop their own MOOC platforms. Currently, the influential ones are XuetangX of Tsinghua University, Chinese MOOCs of Peking University, iCourse and so

on. For a time, there is a great momentum of "you sing, I will be on the stage", and the excellent courses are one after another, so that learners are happy to see the situation. No matter it is a foreign university or a well-known domestic university, they will often select the best teachers, choose the best course team, create sophisticated MOOCs and promote them to the whole society. On the one hand, they have improved their social influence and have carried out good "word-of-mouth" marketing in the Internet era; on the other hand, it is also convenient for ordinary students and social people to study and interact with students from excellent universities in the network environment, and this can also help them fulfill their wished of "Studying in Beijing University", "Studying in Tsinghua University", and "Studying in Harvard" online.

Mooc is an online, large-scale open teaching system based on networked, personalized, and participatory learning, which is a new teaching model integrates publishing resources, learning management, and open network resources[2]. In the learning based on the Mooc environment, the learning progress can be controlled by yourself, and you can use your own fragmented time to learn at any time. The learning process can be deeply interactive, which reflects the concept of "student-centered", "fragmented learning", and "lifelong learning" [1]. Unlike traditional boutique shared courses at universities, MIT Open Course Ware, or static powerpoint slides with a touch of animation, Mooc tends to teach around a certain topic in the form of micro-videos. Usually the time for a MOOC is relatively short, so it emphasizes the connection of knowledge and knowledge, and highlights the key points and difficulties. In this way, not only can we learn knowledge through the most intuitive way of listening to lectures, but also emphasizes human-computer interaction, through the network, homework, discussion and other ways to communicate with each other, aroused people's interest in learning and transfer of knowledge. Mooc is a new teaching mode developed on the basis of constructing learning theory, humanistic learning theory, symbol learning theory and mastering learning theory, etc., combined with the technology of the Internet + era.

However, the emergence of Mooc is not intended to replace traditional teaching. At present, the development of MOOCs has also appeared many problems. For example, there are many registered users, but the course completion rate is very low [3-5]. Many teachers' courses on the Mooc platform are actually "castration" versions of teaching. In order to accommodate the majority of students, the depth of teaching is reduced and the difficulty of homework is reduced. Moreover, just watching learning videos on the Internet is also easy to cause visual fatigue and mental fatigue. Just imagine, if all courses are in the form of MOOC, the first and only thing students do every day is to study online. Do you think whether this is a life to be celebrated or bored with?

In fact, before e-learning became popular in the 1990s, people heve tried the modle of combining online training with traditional training. Especially as college students, learning knowledge is just one of the purposes. College students also need to communicate, the supervision of teachers and other requirements. Therefore, people gradually began to reflect on the simple MOOC teaching method and proposed a hybrid learning mode integrating face-to-face and online learning machine [4, 6, 7]. Its core idea is to use different media and information transmission methods for different individuals to learn. Blended learning combines the advantages of traditional and digital learning, abandoned the pure "watching videos, doing homework" of the traditional Mooc mode, strengthens teachers to guide, inspire, and monitor the teaching process face-to-face, and between students, students and teachers can also conduct in-depth communication, which stimulates the subjectivity and initiative of students in learning. This not only minimizes the cost, but also maximizes the benefits (the benefits here may not only refer to knowledge). However, how to integrate and the degree of integration has always been a controversial topic [4, 5, 8, 9]. Moreover, different disciplines have different requirements for knowledge mastery. Some disciplines only require learning, while others have higher requirements. In particular, when the author is in charge of Advanced Artificial Intelligence and Big Data Analytics for Business in graduate school, I realized that the students had to learn the big data processin language ,but thers was no class time or relatively little class time. Program language learning only requires students to memorize knowledge points such as grammar, but also cultivate students' computational thinking ability and develops students' good programming habits. These tasks are difficult to achieve by relying solely on online learning, and face-to-face guidance is required, especially for Non-computer majors. Of course, the highest level of language learning is that there is no specific language in the eyes, but with the ability to solve problems with computers, and even with critical learning thinking and good knowledge transfer ability (no specific language in the eyes). Considering that, the concept of deep learning [10] was introduced in the mixed learning mode within a short time, and good learning results were achieved.

2. Discussion on Python language deep learning teaching mode

Deep learning means that on the basis of understanding learning, students can critically learn new ideas and facts, and can make connections between different disciplines, and have the ability to transfer existing knowledge to new situations. The purpose of deep learning is to develop the ability of higher-order thinking and realize meaningful learning [11]. Deep learning is a kind of inquiry-based learning, which requires students to be able to carry out in-depth information processing, active

knowledge construction and the ability to solve practical problems. In the era of knowledge economy, in addition to imparting knowledge, another important task for teachers is to cultivate students' innovative ability. The cultivation of innovative ability requires a new teaching framework to support and maintain. Comprehensively considering the characteristics of Python language and the object of education, the project team based on the deep learning theory proposed by E.Jensen and other American scholars , Python language teaching was carried out in mixed mode teaching, focusing on the following points and achieving better learning effects.

2.1 Carefully select learning objectives and content.

Deep learning is an active, exploratory, and understanding way of learning. C language learning, especially for students majoring in financial engineering and financial mathematics, is not to learn for learning, but to cultivate the ability to model and solve problems with computers in the future. Therefore, we should combine professional characteristics in python language learning, select learning content, and develop the corresponding learning objectives.

2.2 Create a deep learning field and cultivate a positive learning culture.

"The realization of deep learning requires the construction and support of learning communities." Deep learning is a fully integrated learning model. Through the establishment of learning teams and project teams to give play to a positive learning culture, let learning learn in collision.

2.3 Establish intelligent learning guide module to realize personalized learning guidance

Deep learning recognizes individual differences in learners. Collected the learning information of students under the mixed learning module, created or updated learner characteristics through technical means such as data mining, established some intelligent guidance algorithms, and completed the guidance of personalized learning through the adjustment of the difficulty of exercises and the push of different knowledge.

3. Multi-pronged approach, fight to make a good Python language battle

In the courses with 51 students as electives, this courses group conducted a preliminary investigation on the course and students' characteristics. The students have no fixed time to operate on computers , for the emphasis on practice, emphasis on training ability of computer language teaching ,it is obviously difficult. If the students don't get on the computer, just memorize some grammar points, it will be difficult to achieve the learning effect, even the cultivation of ability. In the specific teaching process, guided by the concept of deep learning and based on blended learning, the following specific measures are adopted:

3.1 Take MOOC as the platform to solve the problem of short class hours and difficult digestion of basic knowledge

Due to the lack of class hours and a large amount of content in Python language, MOOC teaching was introduced in the teaching process. At the beginning, we adopted such a model:we let students join MOOCs, watch videos and do homework. Then in class, we repeat the content of the MOOC, just at a slightly faster speed. With the students learning gradually into a better situation, we use the class intensive mode, focus on the key knowledge to explain. Finally, let the students learn the basic knowledge by themselves. In class, the teacher mainly talks about the difficulties, key points, and even direct programming, so that the students can experience language learning in the programming. The direct benefit of Mooc is that knowledge is fragmented and can be watched repeatedly, which is very suitable for knowledge point learning and programming language grammar learning. Since the experiment was just started, the cource team has adopted the principle of steady progress. The score of Mooc was counted as 10% of the total score,so as to encourage students to make better use of the Mooc platform to listen to classes and do exercises. The process of doing exercises is also a process of digesting knowledge and cultivating ability, which fits our concept of deep learning. For different students, our exercises are different, and we develop individual learning plans for them. This is also consistent with the concept of deep learning, to prevent individual poor students from giving up learning because of poor exercises.

3.2 Strengthen face-to-face guidance and stimulate students' interest in learning

The adoption of Mooc platform solves the problem of short class hours. For some grammar that you don't understand, students can watch it repeatedly, which is especially helpful for learning knowledge. However, it is difficult to cultivate students' interest in learning by simply watching videos, especially in the early entry section. Therefore, the hybrid teaching model that combines online learning and face-to-face learning has been affirmed. Blended learning is a mixture of teaching models based on constructivism, behaviorism and cognitivism, emphasizing teacher-led activities and student-led participation. Blended learning consists of face-to-face and online learning. In the process of program language teaching, we divide it into formal face-to-face and informal face-to-face. For example, classroom teaching can be regarded as formal face-to-face. In addition to face-to-face classroom teaching, considering that program language is a very practical course, we also require students to go to the lab to practice on the computer. In the lab, teachers and assistants personally guide students to practice on the computer, which solves the problem that students can make mistakes even though they can understand them as soon as they listen. In fact, this is also the requirement to form a learning field and an interest field in deep learning. Informal

face-to-face mainly through QQ groups. When a student has a problem, especially when programming errors, what he wants most is to get guidance and correct the error in time, but the teacher cannot provide the student with guidance anytime and anywhere (and the student is not just learning this course). Through the QQ group, students can get help in time when they encounter problems. This help comes not only from teachers, but also from students themselves. Many students have improved their abilities by answering questions, and they have also received extra points. Informal face-to-face meetings also include computer practice activities that we jokingly call "buy one get one free". After all, if the classroom is often changed to the computer room is not in line with the school's teaching regulations. We formally adjusted it twice, and then arranged about four additional computer practice activities. These computer practice activities are arranged on Wednesdays which will not occupy normal class time, which are informal teaching. We suggest that students can go to the computer room to program if they do not have any classes. And the teacher will also go to the lab to guide them so that they can solve problems on the spot when they encounter problems. This kind of face-to-face instruction allows students to have no burden, and when they have problems that they cannot solve, they can come to the computer room to seek help from the teacher. Come if you have any questions, come if you want to feel the atmosphere (because students can program in their own room alone. We also joked with the students, you waste your own electricity when programming in your own room), so it is very popular with students.

3.3 Use projects as the starting point, improve students' problem-solving abilities

In the theory of deep learning, we don't mind mastering specific knowledge, but to turn knowledge into ability. Based on this, we have carefully designed four projects. As the progress of the study progresses, let students discuss, group, and collaborate to complete these projects, which will be included in the total score. In the process of project promotion, students discussed enthusiastically and cooperated with each other, forming a good atmosphere. Some items, such as "Are you overweight?", many students collected data, formed a good habit of data, and released the software for students to try it out. In a burst of laughter, the students completed the project and gained confidence.

3.4 Develop an online examination system to promote fairness in examinations

In fact, we can basically evaluate student performance through Mooc homework, projects, essays, and usual interactions with them. But why do we have to take the final exam? In the final exam, we test basic knowledge, mainly programming. In fact, our course group also discussed at the beginning of class. Because we are students of financial and economic institutions, the students' interest in learning computer courses is sometimes not very strong. We want to "force" the students to study hard

through the final exam. There are a number of commercial versions of online exam systems, but they are generally based on libraries, and the difficulty of the question drawn by each student is different. And our test is a confirmatory test, just to test the degree of students' knowledge mastery. A large number of questions in the question bank are not suitable for our exams, but students are required to do the questions in the question bank, which turns students into test machines. We adopt a private question bank, which contains a small number of the most basic questions. Through the online examination system developed by us, we can achieve the same difficulty and type of each question for students. This not only achieves the principle of fairness, but also achieves the main purpose of verifying learning knowledge. As long as students study hard in normal times, they can pass the course assessment without reviewing at the end of the semester. In this way, students can also spend more time on reviewing other professional courses. In addition, the general commercial version of the software to the programming of the test data principle, which means that if you are right, you will get a full score, and you will not get a score if you are wrong. full marks for correct, no points. The online examination system we use, from the perspective of program comprehension, can not only test data, but also analyze the structure and semantics of the program, for the wrong program can also give relatively reasonable scores, ensuring the fairness of the test.

4. Effectiveness of the New Teaching Model

The model we proposed in this paper not only applied graduate teaching but also in any language learning. Due a few graduate students, we once adopted this model in undergraduate program teaching. In this teaching, a total of 148 students participated in the MOOC teaching, and the number of exam scores rated excellent (>=90) was 37, good (between 80-90) was 63, moderate (70-80) was 23, passing was 20, and the number of failing was 5. As for the 45 students who did not participate in MOOC teaching, the numbers of excellent, good, moderate, passing and failing were 5, 10, 23, 4 and 2. However, some students were registered but did not participate much, and we also classified these students as those who were taught in traditional classes. It can be seen from the fig.1 that the excellent and good rates of participating in MOOC teaching are significantly higher than traditional teaching. Moreover, due to the participation in MOOC teaching with online assessment system, many students developed good interest in programming language, and then joined some online judge web sites, program frequently and being selected as school-level ACM team members.
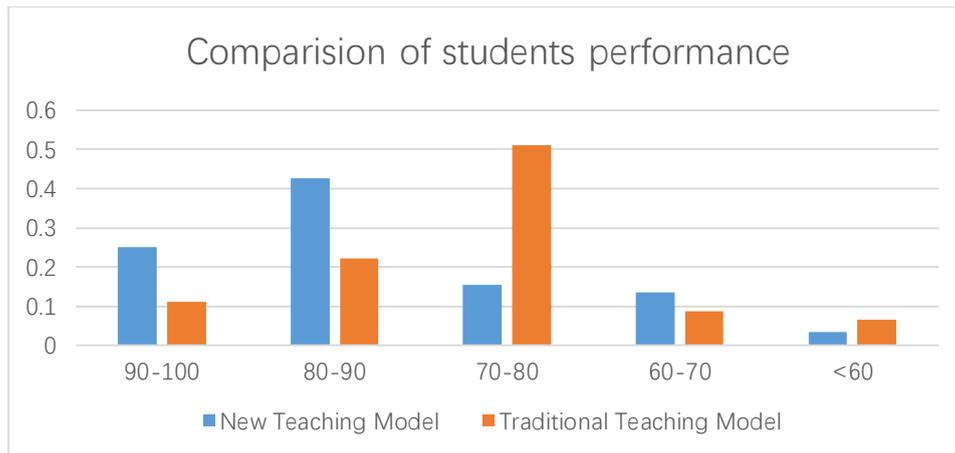
Fig.1 Comparision chart of students performance under the two training models

5. Conclusion

In the practice of language teaching, the course team combined classroom teaching and network teaching, adopts a mixed learning model, and introduces deep learning ideas in the concept. While practicing, the teaching task is better completed , Stimulated students' interest and ability to solve their own professional problems.

Blended learning is an organic combination of online learning and face-to-face teaching. Blended learning abandons the simple online learning mode of "watching videos and doing homework", adds face-to-face communication, emphasizes the importance of building a learning field, and focuses on shifting from knowledge learning to the cultivation of interest and the ability to solve complex problems with computers from knowledge learning. However, the implementation of the program has not taken too long, and it has yet to be tested in the future.

Acknowledgements

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