International Journal of Social Science and Education Research Volume 6 Issue 10, 2023
ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202310_6(10).0001

Construction of Flipped Classroom for Language Majors Based on Big Data Technology

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Abstract

This article clarifies the goal of the flipped classroom and the technical support required by the normal application, expounds the connotation and characteristics of Flipped Classroom teaching mode, analyzes the teaching process of Flipped Classroom, designs the teaching micro video framework of Flipped Classroom, and constructs the implementation path of Flipped Classroom based on big data technology. On this basis, the article explains in more detail the three stages of the flipped classroom, and designs the flipped classroom teaching model from the pre-classroom, classroom and after classroom. Integrating big data technology into the flipped classroom of language majors has promoted the precise and personalized teaching of language majors, and effectively promoted the practice and application of flipped classroom of language majors.

Keywords

Flipped Classroom; Teaching micro video; Big data technology; Implementation path; Language majors.

1. Introduction

In 2018, Chinese Ministry of Education formulated the opinions on accelerating the construction of high-level undergraduate education and comprehensively improving talent training ability, which promotes the revolution of classroom teaching and forms the Small Class Teaching, Blending Learning and Flipped Classroom, Smart Classroom, Online and Offline Teaching Mode [1]. The new teaching mode promotes the reform of classroom teaching methods in Colleges and Universities, and changes the old indoctrination teaching methods with teachers as the main body. Language majors in Colleges and Universities, especially English, Japanese, Korean, German, advocate improving the basic ability of reading, speaking, dictation and translation. The Language majors focus on the language ability itself and make full use of multimedia and network technology to carry out computer-assisted language teaching. This mode changes the single classroom teaching mode in the past [2]. However, the teaching mode of language major in Colleges and Universities is still dominated by teachers' teaching, and the student-centered language major education method has not been formed [3]. Students have a short time to learn foreign languages, and their foreign language foundation is relatively weak. It leads to great learning difficulties in classroom teaching. This will make students less excited about learning, and the awareness of autonomous learning can not be effectively established. These problems are the challenges faced by language majors teaching.

The emergence of flipped classroom has brought dawn to the development of language major, and overturned the traditional universal teaching (Classroom Preparation—Classroom Teaching—Homework Assignment)[4-6]. It is a kind of teacher guidance and student subjectivity, which adopts the mode of teaching micro video independent self-study + Classroom cooperation, exchange and discussion in the pre-classroom stage. However, the biggest impact of big data technology (artificial intelligence, Internet of things, visual data

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202310_6(10).0001

analysis) on the current teaching form is to break the closed characteristics of the original course content. A large number of open and accessible high-quality teaching resources, due to their modular, fragmented and reconfigurable characteristics, promote the teaching content from textual, linear structure to non-linear. Flipped classroom uses computer-aided technology to design teaching micro video, advances the teaching process of knowledge transfer to the pre-classroom stage, and makes teaching micro video enable students to complete autonomous learning. The internalization of knowledge is advanced to the classroom stage, and solved knowledge difficulties through discussion between teachers and students. The content quality of teaching micro video will directly affect the progress of pre-class knowledge teaching. How to effectively integrate teaching content and teaching behavior data into teaching micro video is a hot topic for many scholars. The acceptance and recognition of each student's knowledge is different, and there will also be differences in autonomous learning through teaching micro videos. This requires the effective design of teaching micro video and the integration of the big data technology into the flipped classroom of language majors. This article studies the design strategy of micro video for language teaching based on the big data technology, helps language teaching reform, and promotes the practice and application of flipped classroom for language majors.

2. Connotation and Characteristics of Flipped Classroom

2.1. The intrinsic essence of taking students as subject

The essence of flipped classroom puts the content of courses in the classroom stage into extracurricular activities. And those things that have been done as homework in the after classroom stage are completed in the classroom stage [7]. Flipped classroom subverts the "duck feeding" mode of teaching by teachers and students as audience in universal teaching, and realizes the flipping from teachers' classroom teaching to students' autonomous learning in the pre-classroom stage. Taking teaching micro video as the main learning channel has broken the previous passive learning state of students. It enables students to carry out autonomous learning, provides students with a relaxed learning atmosphere, and improves students' dominant position. Then this method could change students' learning habits and interests, and promote the reform of teachers' teaching thinking and teaching methods.

The basic theory of flipped classroom is constructivism theory, which guides students to learn new knowledge with their existing ability and discusses the difficulties with teachers and students to form a new knowledge structure. Based on this theory, teachers and students need to reverse their previous roles. It can make students become the drivers of knowledge transfer, and make teachers become the guides of knowledge transfer. The content of learning activities can be used to drive the implementation of phase tasks. In the pre-classroom stage, teachers design teaching micro videos according to teaching objectives, teaching contents and teaching behavior data, and delimit the scope of students' study. This method can make students think independently about the problem and deepen their understanding. The fundamental purpose of flipped classroom is to guide students' learning process from shallow knowledge to deep knowledge, change the previous indoctrination "teaching" and rote "learning", and build a constructive learning process for "deep learning".

2.2. The intrinsic representation of taking technology as auxiliary

Information technology is not only an important grasp and supporting force for the smooth development of flipped classroom, but also the material basis for the operation of flipped classroom. The flipped classroom teaching model has been continuously developed with the support of information technology and the Internet, which breaks the limitations of previous experience imitation teaching and extends the knowledge transfer in conventional teaching to

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202310_6(10).0001

the completion in the pre-classroom stage. Teachers use information technology to produce rich teaching micro videos of teaching content, optimize the learning environment, change the previous single text and graphic presentation, enhance the attractiveness of teaching content, and help students learn independently. Students use information technology to make interactive micro videos or slides of difficulties and knowledge cognition encountered in the process of self-study, and interact with teachers and students in the classroom stage to improve the acceptance of knowledge teaching.

The media of flipped classroom teaching mode relies on multimedia networks, mobile devices. Learning methods rely on micro courses, curtain courses, makers, small-scale restricted online courses. Learning materials are composed of multi-modal data information (such as text, pictures, video, audio). The collection of learning materials will affect the development of flipped classroom in the pre-classroom stage. Students with different learning abilities will have different acceptance of the content of teaching micro video. Teachers need to build a multi-source data collection platform integrating online and offline in the pre-classroom stage to collect each student's teaching behavior data, including learning data, evaluation data, psychological data, physiological data. In order to make the teaching behavior data complete, the multi terminals are used to collect the whole chain data of each student (pre-classroom stage, classroom stage and after classroom stage). Through the preprocessing (such as cleaning, classification) of these data, the learning state changes of students can be analyzed, and the relationship between group characteristics and individuality is explored. It uses information technology (artificial intelligence, big data) to model teaching behavior data, finds the mapping between data and eigenvalues, builds each student's user portrait, designs each student's teaching micro video based on this result, and produces accurate and personalized teaching micro video. It can accurately push teaching micro videos to students at different levels of ability, which enables students to refine their self-learning and teaching micro videos in the pre-classroom stage.

2.3. The intrinsic driving of taking thinking as support

At present, the modern teaching thinking of Colleges and Universities is not mature enough. The traditional teaching concept is still the mainstream, which is mainly due to the fact that the innovation of teaching methods, teaching technology and teaching means does not drive the reform of teaching thinking. Most Colleges and Universities have upgraded the information technology of the material carrier. But they ignore the teachers' thinking reform and ideological sublimation, which is easy to restrict the giving of teachers' classroom rights and teaching freedom, and solidify the roles of teachers and students in the flipped classroom. Some teaching theory researchers did not offer suggestions on the reform of teaching thinking, and turned to the teaching theory of "practice center" and "bottom-up". The real "opponent" faced by modern teaching reform is not traditional teaching theory, and the main obstacle is teaching thinking [8-9]. Therefore, in the flipped classroom, the reform of teaching thinking is the first, and let thinking lead the development of technology. Technology should include entity technology and non entity technology [10]. Entity technology mainly refers to the material support means based on information technology. The non entity technology mainly refers to the realization of methods guided by human thought or thinking. The flipped classroom teaching thought is a modern teaching thinking mode based on information technology, which affects the teaching operation process. Flipped classroom is not an empty student-centered teaching plan, nor a simple teaching micro video assisted by information technology. It is the flipping of teaching thinking and the sublimation of teachers' thinking. The reversal of time-space structure in the teaching operation will cause the change of the roles of teachers and students, and promote the deep reform of teaching thinking and logical structure [11]. Before the flipped classroom starts, teachers divide the scattered knowledge in the textbook into several topics, and use

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information technology to spread students' deep thinking. It can guide students to actively participate in the collision between problem situation and knowledge representation, and realize the sublimation of students' thinking in the collision. Teaching micro videos and classroom teaching programs are only the pre-work of flipped classroom, and their thinking is the internal drive to support the smooth development of flipped classroom.

2.4. The intrinsic guidance of taking role as oriented

The flipped classroom teaching mode relies on information technology to make teaching enter the "reverse order" [12], which has reformed the teaching process and guided the previous "teaching before learning" to the "learning before teaching" mode. It has changed the way of teachers' teaching and students' learning, changed teachers from the past teaching and solving puzzles into learning guide, and changed students from the past passive learners into autonomous learners. It enhances students' participation and sense of experience in learning, and gradually cultivates students' autonomous learning ability. Meanwhile, teachers should actively adjust the original teacher-student relationship model, shorten the distance between teachers and students, and help their own role transformation.

The flipped classroom teaching mode realizes two levels of flipping. One is that the time sequence of learning tasks is flipped, and the content previously learned in the classroom stage is completed in the pre-classroom stage. The second is that the roles of teachers and students have been reversed. Through the reconstruction of this role, teachers' teaching and students' learning methods have been changed, students' awareness of autonomous learning has been shaped, and teachers' thinking as guides has been constructed. In this mode, the teacher is the participant, the controller of the classroom teaching direction, the researcher of the teaching content, the designer of the teaching micro video, and the evaluator of the teaching effect. Students are the leaders, the practitioners of classroom teaching and the experience of teaching effect. This role change has broken the previous stereotype of "focusing on the past and the best", "not prone to change, not thinking about change" . It can let students have the motivation and ability of autonomous learning, stimulate their autonomous learning, use guiding strategies to make students manage and sort out themselves, and establish the confidence of autonomous learning.

3. Design Strategy of Flipped Classroom Teaching Mode for Language Majors

Flipped classroom teaching method subverts the traditional teaching, which is mainly due to the differences between knowledge transfer and knowledge internalization. In the traditional teaching, knowledge transfer is completed by teachers through teaching in the classroom stage, and knowledge internalization is completed by teachers' homework and review. In the traditional flipped classroom, knowledge transfer and knowledge internalization are advanced one step. Knowledge transfer is placed in the pre-classroom stage and completed by watching teaching micro videos and guiding exercises. The internalization of knowledge is completed in the classroom stage through brief evaluation, heuristic questions, summary and feedback. The structure of the traditional flipped classroom is shown in Figure 1. However, the traditional flipped classroom lacks knowledge consolidation and teaching evaluation after class. In view of this problem, the article explores the flipped classroom in the following three aspects: the design strategy of teaching micro video based on the big data technology in the pre-classroom stage, the teaching design strategy in the classroom stage, and the knowledge consolidation and teaching evaluation strategy in the after classroom stage. The flipped classroom for language majors is shown in Figure 2.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202310_6(10).0001

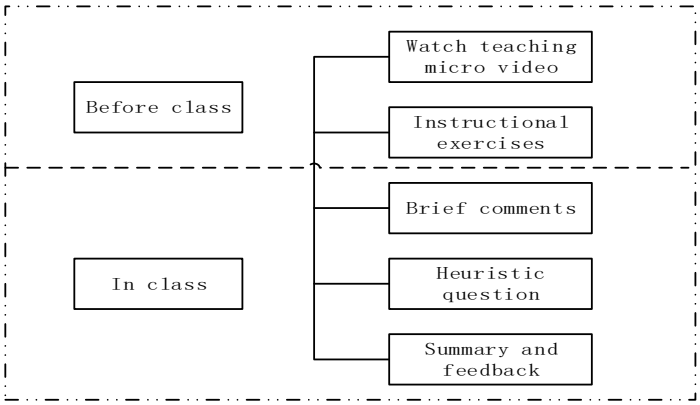

Figure 1. Structure of traditional flipped classroom

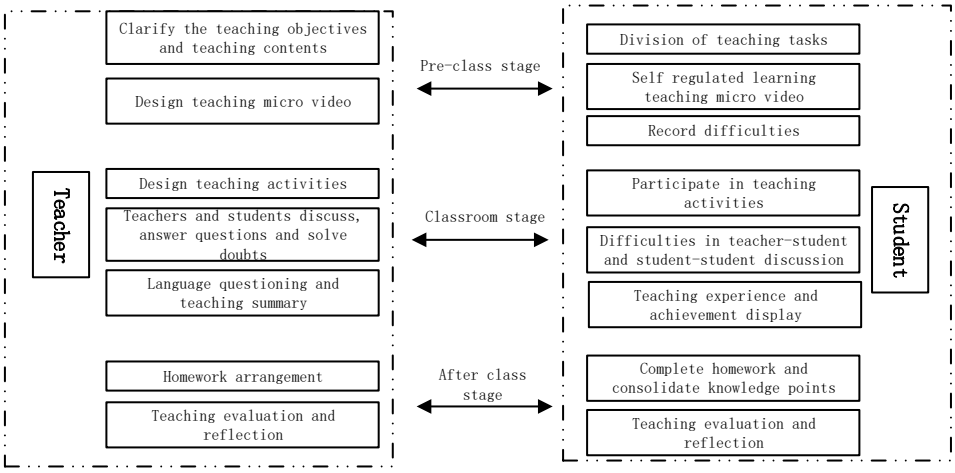

Figure 2. Structure of flipped classroom for Language Majors

3.1. Pre-classroom stage-Design Strategy of teaching micro video based on the big data technology

In the pre-classroom stage, teaching micro video needs teachers to design according to teaching objectives, which is a necessary condition for the successful implementation of flipped classroom. Its main purpose is to help students carry out pre-autonomous learning [13]. In the pre-classroom stage, teachers cannot provide students with high-quality self-study resources, which is difficult to stimulate their interest in learning and fail in the self-study[14]. This requires teachers to design guiding teaching micro videos according to students' characteristics and needs.

Teaching micro video should include three parts: topic selection, teaching methods and video production. The topic selection of teaching micro video should select teaching content or knowledge with relatively independent content and moderate information. The selected content should have high use value and be recorded with appropriate teaching methods. Teaching micro video can be produced in the following ways:

1).Mobile equipment shooting and production, using professional photographic equipment or mobile phones to shoot.

2).Screen recording production: use professional screen recording software such as screencast or PowerPoint for video recording.

3).Synthesis production, editing and synthesis using Flash software.

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202310_6(10).0001

4).Production in the recording and broadcasting room and recording in the professional recording and broadcasting room. Teachers can comprehensively use the above micro class production methods according to the actual teaching needs.

How to obtain students' characteristics and needs has become the key factor for the success of flipped classroom. Students' characteristics and needs can be called teaching behavior data, which mainly includes each student's learning behavior, learning status, learning habits, video clicks, question scores, learning feedback. The clustering method is used to aggregate and classify structured and unstructured data, model each student's user portrait, and design each student's personalized teaching micro video. This requires a survey of each student's knowledge level and learning ability in the pre-classroom stage. It needs to collect the teaching behavior data of the whole process of students' learning by building an online and offline fusion multi-modal acquisition platform, break through the previous single text data, and integrate the multi-dimensional data recorded in multiple scenes. Online collection is mainly through online learning platforms (micro courses, curtain courses, makers, small-scale restricted online courses, various cloud platforms and online courses), using technologies(web crawlers and logs) to collect data such as interactive communication and online question making, and using intelligent wearable devices (smart Bracelets and micro cameras) to extract data such as students' psychological and emotional states in the learning stage. Offline collection mainly collects data such as teaching interaction, learning status, questionnaire survey, test scores through the intelligent learning environment.

After the collection of teaching behavior data, we need to use artificial intelligence technology to preprocess data, integrate data drive into data processing, establish a data model by extracting the characteristics of teaching behavior data, and take the data characteristic value formed in the language major teaching behavior data collection stage as the input value. Through data training, a scalable behavior recognition model is formed to mine the results of teaching behavior state (teaching effect, learning effect, learning progress, learning attention, learning change trend, learning habits, learning emotion influencing factors). This behavioral data modeling can enable teachers to improve their surface cognition to implicit state cognition, and change the previous inductive and summative shallow teaching. we need to move towards in-depth teaching of in-depth analysis, build personalized and accurate teaching, reduce the impact of teachers' own factors on teaching, and enhance the support of information technology for teaching. The teaching behavior data collected by the online and offline multi-modal platform will be used to build a personalized teaching plan for each student by using user portrait modeling. The flipped classroom of language majors based on the big technology is shown in Figure 3.

Through problem guidance and integration of multi platform teaching resources, we could design the teaching micro video of each student, embed the problem situation into the teaching content, let students encounter problems, explore problems, solve problems in this situation, and improve students' cognition and acceptance of knowledge. In the process of autonomous learning, students learn the teaching content according to the teaching micro video, understand the teaching content through questions, and complete knowledge transfer.

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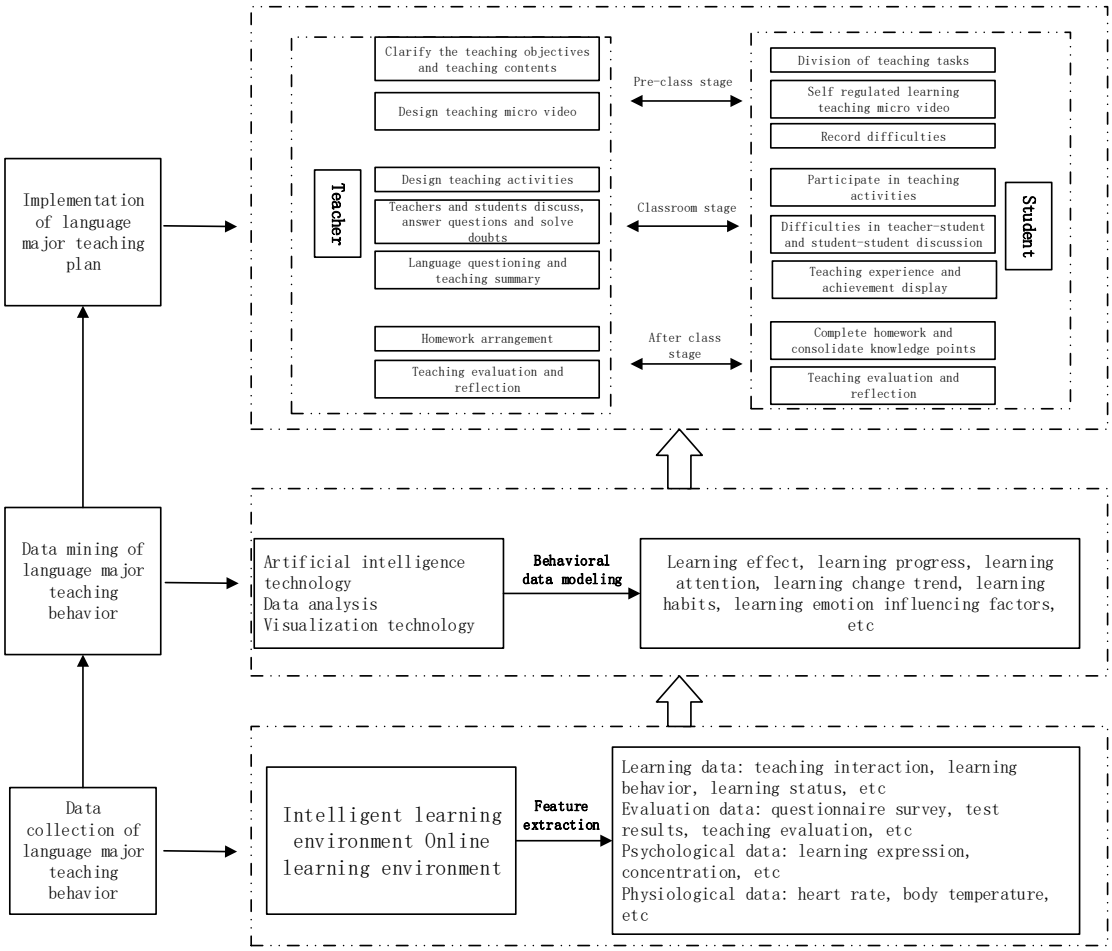

Figure 3. Structure diagram of flipped classroom for language majors based on the big technology

3.2. Classroom stage - Instructional Design Strategy

.In the pre-classroom stage, the different understanding ability and knowledge level of each student will affect the teaching effect of teaching micro video and make students have different doubts. Students can exchange their problems in the pre-classroom stage, solve their doubts and record the common difficulties. According to the feedback of students on problems in the pre-classroom stage, teachers design classroom teaching activity plans in combination with teaching objectives, teaching contents and teaching behavior data, which can include translation and transposition. This can mobilize students' enthusiasm for learning, strengthen students' exchange of confused knowledge, and carry out targeted knowledge transfer. Meanwhile, teachers always need to take students as the main body to carry out teaching activities, give students an appropriate amount of independent activity time, design various teaching activities, and stimulate students' awareness of independent exploration of problems in the classroom stage. Teachers can use problem guidance to make them think independently, help students complete the internalization of knowledge, build their own problem-solving thought, and have a deeper understanding of the teaching content, objectives and difficulties.

Excellent teaching programs need to be completed by teachers and students together. Teachers and students are the objects of cooperation and exchange. In the process of solving the problem, teachers and students should be tested and corrected to make the solution more scientific. Language courses are characterized by language diversity and flexibility. Different types of teaching activities (interactive sharing, practical activities) are carried out in the classroom stage according to students' characteristics, assessment standards to promote students' in-depth learning. Interactive and sharing teaching activities mainly focus on student interaction,

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202310_6(10).0001

achieve resonance at the thinking level, share the gains in the deep learning, and enhance the collaboration and cohesion of the group. Practical teaching activities are mainly oriented to language professional courses with strong practice and integrate theory into practice. By dividing heterogeneous groups, teachers throw out the problems encountered by students, establish interaction and cooperation between students, build a learning community, give full play to students' respective advantages, and guide students out of the misunderstanding generated in the discussion. Through the cooperation and exchange of "taking problems as the main line", we can solve problems and improve students' ability in critical and creative aspects. Learning pyramid theory shows that the average retention rate of "listening" learning method is much higher than that of "teaching to others" [15]. Students can use cooperative communication and autonomous learning to show their learning results in the classroom stage, report their learning experiences, share and teach learning methods, and effectively improve the average retention rate. After the students' report, teachers need to refine the results, summarize the teaching contents, convert pure experience into scientific methods, promote the internalization and understanding of knowledge, and integrate knowledge into the cognitive structure of students. This teaching plan has changed the roles of teachers and students, which makes teachers become listeners and guides. Students become thinkers and debaters, give full play to the students' learning subject status, and become leaders from thought to behavior.

3.3. After classroom stage - knowledge consolidation and teaching evaluation strategies

In the after classroom stage, teaching needs to design novel homework question types to consolidate the learning achievements in the pre-classroom and classroom stage. This can make students enter the deep learning mode, and let knowledge be integrated into students' cognitive structure [16]. New types of homework questions need to break through the previous simple types such as retelling and translation, and focus on the types of multi-objective, multi task and high interest. It is necessary to abandon the previous thinking of questions and repeated training, and guide students to integrate multiple resources to conduct inquiry learning on homework. Through the consolidation of these assignments, we can effectively complete the internalization of knowledge, integrate the previous knowledge into the new knowledge structure, improve students' ability to use comprehensive thinking to deal with problems, and form a structured knowledge chain. Meanwhile, we collect students' evaluation of teaching content at the after-school stage through the multi terminal platform, and use big data technology to push personalized teaching resources to students for the personalized learning needs.

The evaluation system of flipped classroom is an essential link, which is conducive to the development of language majors teaching and the formation of language majors teaching rules. This evaluation system mainly includes the systematicness, integrity, process, result, guidance and diversity of language teaching. The teaching evaluation of language majors is easily affected by the teaching process, which needs to start with the teaching objectives, teaching contents, teaching methods, teaching steps. It takes the internalization of knowledge as the main assessment objective and evaluation guidance, and quantifies students' autonomous learning, active participation, classroom interaction. The teaching evaluation evaluates the whole teaching process and teaching results in a diversified and multi-dimensional way, tests the achievement of teaching objectives and teaching priorities, evaluates every link of the teaching process, considers the enthusiasm and knowledge acceptance of students' autonomous learning in the pre-classroom stage, guides students to evaluate teaching satisfaction in the after classroom stage, and carries out self-evaluation and mutual evaluation between teachers and students. This method can urge and encourage students to improve their autonomous

ISSN: 2637-6067 DOI: 10.6918/IJOSSER.202310_6(10).0001

learning, and provide teachers with teaching basis and improvement strategies for the next stage of language majors professional teaching content.

4. Conclusion

As an "exotic product", flipped classroom has achieved rapid development. Based on the big data technology, it overturns the concept of "teaching before learning" in the traditional language teaching mode, changes the structure of knowledge transfer and internalization, resets the classroom roles of teachers and students, enhances students' classroom participation and experience, and improves students' autonomous learning ability. However, in the current educational environment, flipped classroom needs to refine the classroom on the basis of in-depth learning and optimize the flipped classroom in depth.

Conflict of Interest: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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5. Data Availability Statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

6. Funding

This study was funded by Philosophy and Social Sciences Research Fundation of Jiangsu Province (Grant No:2022SJYB1916).

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