Construction and Empirical Research on Overseas Students' Academic Early Warning Mechanism based on Cloud Class Teaching Network Platform

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Abstract. Academic early warning is an important educational management means to reflect the current "student-centered" educational concept. On the Cloud class teaching network platform, by setting up experimental teams and control groups, and using the academic early warning mechanism composed of dashboard, learning experience value and intelligent robot, we carried out the experimental research on the online and offline Hybrid Teaching of Chinese synthesis for Chinese zero foundation foreign students. The results show that foreign students can respond positively to the early warning notice issued by the system, and teachers can also master the situation of "students with learning difficulties" according to the visual data on the platform and carry out personalized counseling. The overall teaching effect of the experimental group is better and the passing rate is significantly improved. The early warning mechanism not only has a significant correlation with the improvement of "students with learning difficulties", but also promotes the English learning of other foreign students.

Keywords: Cloud class teaching network platform (CCTNP); Academic early warning; Overseas student; Learning analytics; Network teaching platform.

1. Introduction

Over the past 20 years, China's higher education has gradually transitioned from elite education to civilian education, and it has become very common for college students to fail in the course examination. A little negligence may lead to failure to graduate normally, or even lose confidence and drop out halfway, resulting in a significant waste of educational resources (Cao et al., 2007). It takes a lot of time and energy to master the situation of students under the traditional management mode. How to timely understand students' academic information and realize early warning and assistance has always been a headache for education management departments and teachers. However, with the gradual application of big data, artificial intelligence and learning analytics in the field of education, many online courses or online and offline mixed courses in the form of MOOCS and SPOC are rapidly popularized, creating conditions for accurately mastering the situation of college students, especially "students with learning difficulties".

Under the initiative of “one belt, one road” has been greatly increased. To ensure the quality of international students and strengthen their academic management, it is an urgent task for universities. At present, most colleges and universities are prone to academic problems because of the non-sharing of information in management, resulting in some foreign students unable to graduate. Therefore, in the information education environment, establishing a perfect academic early warning mechanism has high value for the current education and teaching management and research in Colleges and universities.

2. Related concepts and features

2.1 Cloud class teaching network platform

cloud class teaching network platform (CCTNP) is a relatively mature network teaching cloud platform developed under the concept of "Internet plus education". It has basic functions such as check-in, notification, homework, live broadcast, grading, grouping, testing, discussion, data transmission, data statistics, etc., which can process large data and convert information into for teachers and students (Cheng et al., 2017). CCTNP has strong real-time feedback and interactive teaching function, which can meet diversified teaching needs. The CCTNP comes with a relatively perfect formative evaluation system, which automatically completes the formative evaluation by recording the learning track and results of each student and displays it through the dashboard. It is a model of the deep integration of network teaching platform and mobile social media (Miao Q J, 2017).

2.2 Academic early warning

Academic early warning is an indispensable part of information education management in Colleges and universities. Its purpose is to improve teaching performance and students' code of conduct, reduce educational contradictions caused by unqualified courses, and help "students with learning difficulties" reasonably arrange their learning process and successfully complete their studies (Chen et al., 2011). The concept of "academic early warning" was first put forward in 2000. Its function is great, but its real implementation is troublesome, because if we want to realize the academic early warning function mechanism, we must first establish a set of early warning evaluation system, which determines the accuracy of early warning objects and the accuracy of early warning process, and also affects the effect of subsequent assistance and incentive for "students with learning difficulties". At present, the assistance to "students with learning difficulties" in Colleges and universities mostly stays in the passive response after the problems are exposed, and the assistance methods are single and backward (Yuan et al., 2014). Therefore, scholars such as Jin Yifu put forward the "Trinity" early warning information discovery and generation model of curriculum, classroom and extracurricular (Jin et al., 2016), hoping to fully understand students' learning and social life (Annika et al., 20115).

2.3 learning analytics

Learning analytics uses the latest technologies in the fields of computer science, pedagogy, data mining, statistics and machine learning to collect, analyze and creatively apply data from teaching and learning, education management and services, so as to better improve educational practice (Huang et al., 2012). By using learning analytics and technology to mine and analyze the data in various teaching management systems and relevant daily life data of smart campus, we can more clearly grasp the operation status of teaching and life, and carry out real-time monitoring of students' learning and life conditions on the premise of abiding by ethics, so as to find problems in time and make early warning, intervention and regulation, At the same time, it can also provide support for optimizing the education and teaching process, improving teaching performance, assisting education management and leadership decision-making (Gu et al., 2012).

3. Early warning mechanism of CCTNP teaching network platform

Learning monitoring and early warning means require teachers to timely understand students' learning situation and psychological state. Its early warning is not a purpose, but a teaching management mechanism to stimulate and promote the maintenance of normal learning motivation. The CCTNP platform can automatically record all the footprints of students and form an academic early warning mechanism on this basis. The platform dynamically records students' learning performance mainly through learning experience value. Learning experience value adopts mathematical counting method to help teachers and students dynamically understand learning

progress. On the platform, teachers can compare the learning situation of a student in a period of time, and can also horizontally compare the ranking of experience value of a student in the class, so as to provide basis for the formative evaluation of the student. At present, the early warning mechanism is mainly aimed at the micro field of classroom teaching. Its relevant stakeholders are mainly teachers and students, and it has not involved the education managers in the macro field. However, its early warning function is complete and has strong practicability. The early warning mechanism of the platform is mainly realized from the following three aspects.

3.1 Using learning analytics to generate dashboard and display learning data in real time

CCTNP makes full use of learning analytics and related technologies to integrate and process the fragmented data in the teaching process of teachers and students, and display it by visual means. It can intuitively present students' learning results and see their learning process data, including students' activity participation, video viewing rate, test completion, learning experience value (Cheng et al., 2017). In the process of teaching, teachers should timely check the big data report of teaching, understand the overall learning participation of students, identify "students with learning difficulties", examine why the experience value of some students is significantly lower than the average level of class and understand the specific reasons; At the same time, based on the results of data analysis, students can quickly understand their own and class learning, and find out their own shortcomings in learning. In addition, by using learning analytics data, teachers can master students' learning preferences, styles and needs, know each student's advantages and existing problems, so as to accurately provide personalized guidance for students and finally improve teaching performance (Gao et al., 2018). The platform management interface is shown in Figure 1.

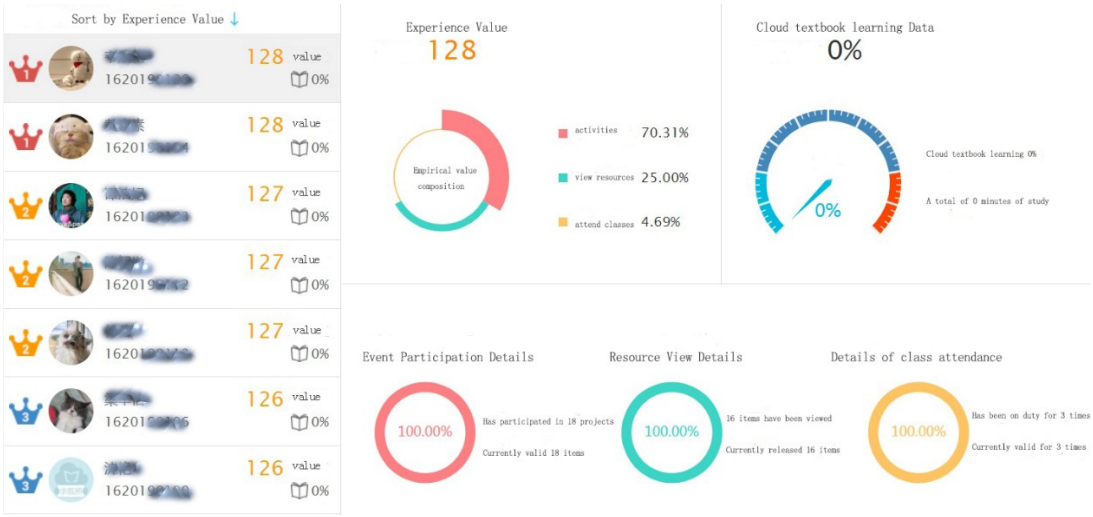

Figure 1. Student learning report interface displayed on the teacher side

3.2 Skillfully use the learning experience value to form the usual performance and realize the formative evaluation

In order to make the learning process achieve the effect of digital evaluation, teachers need to set a certain learning experience value for various teaching tasks in the CCTNP, and the experience value will increase only after completing the tasks within a certain time limit. For watching micro classes or other tasks that are easy to complete, the experience value can be set as 3 points; If students need to make more efforts to complete tasks, the experience value can be set as 4-6 points; For tasks that can only be done through team strength, we recommend setting the experience value to 10-20 points (Wang et al., 2020).

The projects that gain experience value mainly include the following 10 tasks. By default, the proportion of the platform according to the weight is: 1) test, 20%; 2) Light live broadcast / discussion, 15%; 3) Homework / group tasks, 15%; 4) Video resource learning, 10%; 5) Non-video resource learning, 10%; 6) 10% points for being praised by the teacher; Others include classroom performance,

brainstorming, sign in and questionnaire, accounting for 8%, 5%, 5% and 2% respectively. Of course, we can modify it according to different course types. For example, when we take the comprehensive Chinese course for foreign students, we need strong self-discipline and continuous knowledge accumulation according to the law of Chinese language learning. Therefore, we adjust the weight of tests and assignments higher, which can guide students to study and cultivate habits. By setting the weight of the above items, the redistribution of experience value is realized and the guiding role of formative evaluation is achieved.

In Figure 2, the experience value level and growth curve of a student are displayed in real time on the CCTNP platform. A comparison between the student and the excellent students in the class and the average experience value is displayed in the radar chart on the left, which truly and accurately reflects that the student's learning situation is lower than the average level and there is a large gap from the excellent students; The growth curve of the student's experience value is shown on the right, indicating that some learning tasks have not been completed and their learning sustainability is not strong, which needs the academic early warning mechanism to play a role.

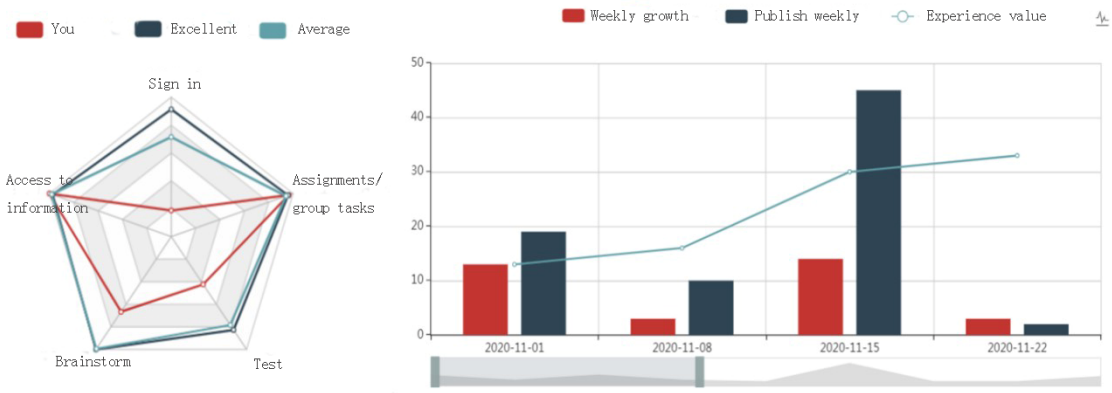

Figure 2. Growth curve of students' learning level and experience value

3.3 AI robot small ink makes intelligent and intimate reminders and suggestions

Unlike some foreign teaching platforms, which use e-mail to inform teachers and students of their learning, The CCTNP adopts the most advanced artificial intelligence (AI) robot technology, uses learning analytics and its technology, reports the learning briefing of the previous class to the teacher according to the learning records of the previous course, reports the students' viewing of resources, homework and group tasks, and gives the "students with learning difficulties" name list; In addition, each student will also receive a report on their own learning situation pushed by Xiaomo on the mobile terminal, which has the function of summary, supervision and early warning. This function has a good reminder and supervision function for students with loose learning.

At the end of the course, collect data through small ink to generate class summary / detailed data and class teaching report. The former includes summary and detailed data such as students' participation in activities, browsing resources and micro class learning; The latter includes data such as resource report, activity report, weekly teaching report and learning situation analysis. These become the evidence of curriculum summative evaluation, also provide the basis for teachers to improve their teaching, or write teaching summary and prove their teaching results to higher education managers. For example, teachers report the situation of "students with learning difficulties" in the comprehensive Chinese curriculum to the educational administration, students, parents and other relevant stakeholders, and then these relevant personnel carry out targeted "poverty alleviation" for the students.

4. Applied research on academic early warning -- Taking "Chinese comprehensive" as an example

4.1 Introduction to "comprehensive Chinese" Course

"Chinese Comprehensive" is the main course, basic course and core course of preparatory classes for foreign students. It undertakes the task of systematic Chinese knowledge teaching and comprehensive Chinese language skills training. Textbook used: Chinese Course (Beijing Language and Culture University Press, Third Edition, 2016) is divided into three volumes. It integrates a variety of teaching methods. The teaching contents include basic Chinese knowledge, skills, culture and strategies, as well as the training of listening, speaking, reading and writing speech skills and verbal communication skills, with the goal of cultivating students' comprehensive language application ability and cultural literacy. Through the study of this course, students should master certain skills Knowledge of Chinese and Chinese culture, with preliminary language ability and language communication ability, master relevant learning and communication strategies, meet the communication needs of daily life, learning and general social occasions, and the Chinese level can reach HSK level 4 or above at the end of learning.

4.2 Research questions and assumptions

Hypothesis 1: the information-based teaching model based on CCTNP has more advantages in learning performance than the traditional teaching model.

Hypothesis 2: in the information-based teaching process based on CCTNP, the application of academic early warning mechanism is positively correlated with academic achievement.

Hypothesis 3: the information-based teaching model based on CCTNP is better than the traditional teaching model in learning experience.

4.3 Research object

Taking the international students enrolled in 2020 as the research object, we randomly selected two classes from four nature teaching classes, with 15 students in each class, Class (1) is the experimental group and class (2) is the control group. The Chinese comprehensive course taught by the two classes is 210 class hours. The same teacher adopts two teaching modes: information-based teaching based on CCTNP and traditional classroom teaching to carry out a one semester experimental teaching research.

5. Data results and analysis

5.1 Analysis of final grades of different classes

Before the class, we first obtained the zero basis of students' Chinese level from the Enrollment Office, which ensures the reliability and validity of the measurement. After a semester of teaching in the two classes, we use the test papers proposed by the school to carry out the final examination of the course, and the results are used as experimental data. Enter the final scores of students into the Chinese version of stata16 for statistics. The counting data are expressed in n (%) and the measurement data are expressed in ($\bar{x}\pm$ s). It conforms to the normal distribution for t-test. The difference is statistically significant with $P < 0.05$. The results are shown in Table 1.

Table 1. Comparison of results between experimental and control group ($\bar{x}\pm$ s)

Groups	n	Final results
class (1)	60	82.365±9.158
class (2	60	77.241±11.648
t		3.115
P		0.029*

The average scores of Chinese comprehensive final examinations of class (1) and class (2) are 82.365 and 77.241 respectively. In the independent sample t-test, the significance level of final Chinese comprehensive score is $p = 0.029 < 0.05$, and the difference is statistically significant. Moreover, the passing rate of class (1) students is 100%, while that of class (2) is 82%, which shows that there is a difference in the Chinese level scores of the two classes when two different teaching modes are used. In addition, the standard deviation of class (1) is less, indicating that there are few low scores, which promotes the learning of "students with learning difficulties", and its average score is also higher than that of class (2) Therefore, the class Chinese score based on CCTNP information teaching mode is better than that of traditional teaching, which shows that our hypothesis 1 is true.

5.2 Correlation between the application of academic early warning mechanism and final examination results

As mentioned above, the academic early warning on the CCTNP platform is mainly reflected by learning experience value. Therefore, we will no longer carry out teaching activities and assign tasks before the end of the semester examination, stop the change of experience value, export experience value data and final results for statistical analysis. The specific situation is shown in Table 2.

Table 2. Statistics of experience value and final score of experimental teams ($\bar{x}\pm s$)

class(1)'s items	n	Results
Learning experience value	60	225±28.901
Final results	60	82.365±9.158
r		0.798
P		0.042*

The teacher made full use of the CCTNP online teaching platform to carry out experimental teaching for 60 students in the experimental group for one semester, and the average learning experience value reached 225 points, The value of Pearson correlation coefficient (R) is $0.798 > 0.7$, and there is also a significant difference in P value, which indicates that the two variables have a high positive correlation, that is, the more learning experience students obtain, the higher their test scores. Therefore, hypothesis 2 is also true.

5.3 Learning experience of students in the experimental group

Learning early warning mechanism is an important educational means to reflect the current "student-centered" educational concept. Teaching should not only look at the results, but also pay more attention to the process. By using learning analytics and related technologies, we can timely understand students' learning situation, provide students with personalized independent learning resources and improve students' learning experience. Compared with the practice that mobile phones are strictly prohibited in traditional courses, students are encouraged to use mobile phones or mobile devices to participate in teaching in our classroom, which is very satisfactory to students. Through the questionnaire survey on the learning experience of the students in the two classes, the survey results are shown in Table 3. The average satisfaction rate of the students in the experimental class with the information-based teaching mode based on CCTNP is 89.51%. Using the academic early warning function of CCTNP can more effectively promote students' continuous learning, promote the interaction between teachers and students and enhance their interest in learning. In traditional classroom teaching, students' performance is not obvious, and their satisfaction is only 59.97%. There is a significant difference. The information-based teaching model based on CCTNP is significantly better than the traditional teaching model, which also shows that hypothesis 3 is true.

In addition, many foreign students' learning ability, self-management ability, thinking ability and learning methods do not meet the needs of higher education and teaching, and have strong plasticity. Taking them as experimental objects has positive educational significance. In Table 3, the satisfaction of the first survey item of the experimental group is the highest, reaching 98.59%, and the performance of other items is also significantly better than that of the control group, which shows

that the academic early warning mechanism is a very effective teaching management means and plays a good role in promoting students' learning habits (Fu et al., 2007).

Table 3. Comparison the learning experience of students in the two groups (%)

Survey items	class (1)		class (2)	
	satisfied	average	satisfied	average
Can play the role of supervision and reminder	98.59	1.41	55.76	44.24
Can mobilize learning enthusiasm	87.26	12.74	65.39	34.61
Can improve interest in learning	85.68	14.32	70.24	29.76
Conducive to self understanding	92.47	7.53	59.25	40.75
Promote timely communication between teachers and students	83.55	16.45	59.21	40.79
Total average score	89.51	10.49	59.97	40.03

6. Conclusion

In the education big data environment, the use of CCTNP to carry out the teaching of Chinese as a foreign language can make full use of the advantages of information technology, timely grasp the situation of students, especially the learning situation of "students with learning difficulties", and create conditions for personalized teaching. Through the data analysis of the experimental research results, the information-based teaching mode using the academic early warning mechanism can achieve better learning results than the traditional teaching mode. Students show better learning fun in the teaching of CCTNP. At the same time, it also constructs a teaching mode with temperature, emphasis on process and emphasis on experience.

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Disclosure Statement

No potential conflict of interest was reported by the author.

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