

Research on "Trinity and Multi-party Cooperation" Academic Early Warning and Prevention Mechanism under OBE Concept

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Abstract: In recent years, universities pay attention to students-oriented, respect personality development, teach students in accordance with their aptitude and teach them at different levels, and strive to provide students with more space for independent choice, study and independent thinking. At the same time, it is necessary to strictly carry out the training plan and construct a perfect early warning system for students to complete their studies with high quality from the aspects of educational administration and student management. Introducing the OBE (outcome-based education) education concept, it is advocated that the teaching plan should be designed from the teaching results and the actual needs of students, and the course content should be modularized and targeted teaching modules should be given. This paper puts forward a forward-looking "Trinity, Multi-party Cooperation" academic early warning and prevention mechanism, and gives an academic early warning process of prevention in advance and intervention in the event, as well as academic early warning grading standards, so as to help students resolve their academic crisis and continuously improve the quality of personnel training and the competitiveness of schools through management and education.

1. Introduction

In recent years, universities pay attention to students-oriented, respect personality development, teach students in accordance with their aptitude and teach them at different levels, and strive to provide students with more space for independent choice, study and independent thinking [1]. At the same time, we must start from the aspects of educational administration and student management, strictly implement the training plan, and build a perfect academic early warning system to ensure that students complete their studies with high quality. Students' studies are a comprehensive measure of teaching achievements and learning effectiveness. By setting up an early warning mechanism for studies, starting from solving students' factors, it can not only help students reduce their academic crisis, but also help to analyze and improve non-student factors in academic problems, thus improving the quality of teaching [2].

Students' early warning mechanism refers to taking the monitoring of students' learning process as the starting point, using computer technology and other means, through the multi-party communication and cooperation among schools, society, parents and students, giving information feedback on students' learning process and quality, giving urgent tips or pre-informing about students' problems and difficulties in learning, giving timely protection and intervention, and warning students about the state of the learning process [3-4]. This paper discusses the design of "Trinity and Multi-party Cooperation" academic early warning and prevention mechanism under the concept of OBE(outcome-based education), puts forward the "Trinity" early warning information discovery and generation model of the school, the family and the students themselves, and establishes two types of six-level signal system and feedback mechanism of academic early warning.

2. OBE theory elaboration

OBE's result-oriented education clearly means that everything in the education system must be carried out around a fundamental goal, and all students can achieve the goal and succeed after a

complete learning experience. That is to say, we should first have a clear position on the educational results and teaching objectives of the course, and then organize teaching, guidance and evaluation to ensure that this teaching achievement can finally happen.

This means that when determining the learning outcomes, besides emphasizing students' mastery of traditional theoretical knowledge related to disciplines, they also need to emphasize the mastery of interdisciplinary professional skills related to future occupations, the ability to solve problems and the ability to work with others [5]. OBE emphasizes the combination of educational results with students' needs and social needs, so as to improve students' competitiveness in society after graduation.

Applying OBE concept to school education system will bring about a series of changes, such as: refocusing courses and positioning teaching objectives, syllabus and teaching strategies; From traditional teaching emphasis on input to modern emphasis on output; From teaching process to teaching purpose; From teaching plan to teaching performance; From teaching courses to teaching results.

Results are the core of OBE system, and learners can obtain clear and verifiable results after a teaching cycle. In the learning process, all activities are organized around the learning results. These achievements are mainly reflected in three aspects:

- (1) Students should know what knowledge they have mastered through study;
- (2) With the present level of knowledge, what students can really practice and what abilities can embody;
- (3) Assess how much confidence and motivation students show in their learning outcomes.

The learning achievements in the above three aspects can be realized in various ways and means.

3. The necessity of establishing an early warning mechanism for studies

3.1. Deficiencies in teaching management

On the one hand, with the expansion of university enrollment, the number of students in universities has surged in a short time, and the number of many colleges has exceeded 10,000. However, the building area, teaching places, teaching equipment and teacher allocation of schools cannot be increased simultaneously in a short time, which has caused the shortage of educational resources in many independent schools.

On the other hand, most universities are affiliated with or cooperate with a public university, and their teaching system and management system are mostly borrowed or even copied, which leads to the unreasonable orientation and school-running ideas of universities, and further to the unreasonable training plans and teaching ideas. All these are closely related to the emergence of students with learning difficulties.

3.2. Impact of rapid economic development

With the rapid development of Chinese society, China's higher education has also made great progress. On the one hand, the education level of the people has been generally improved, which further promotes the rapid development of the economy. On the other hand, due to the rapid increase in the number of college graduates, the employment pressure of college students is constantly increasing, which leads some students to either devote too much energy to various practical activities and have no time to take care of professional studies, or they have no confidence in their future, are passive and slack, indulge in the internet and have no intention of studying.

3.3. Existing measures are incomplete

Because of the lag of education, most of the existing measures are based on the results. When a student has failed many courses, the situation is already serious, and the best opportunity for correction is missed, and the corresponding measures are not taken at the beginning of the matter to prevent the situation from getting worse [6]. On the other hand, the education and management of universities lacks communication and contact with parents, which causes parents to be unable to

know the students' school situation in time and to play the role of supervision and auxiliary education in time.

4. Establish a "trinity, multi-party cooperation" academic early warning and prevention mechanism

4.1. Academic early warning model

The general idea of outlier mining is [7]:

In a data set with n data objects, an expected number of outliers is given or agreed, and the first k objects which are significantly different from other data objects in the data set are mined. There are a series of outlier mining algorithms, including statistical-based, distance-based and deviation-based detection algorithms, and outlier data obtained by conventional data mining algorithms.

Under the concept of educational OBE, the "Trinity and Multi-party Cooperation" academic early warning and prevention mechanism based on outlier mining and analysis technology can be constructed as shown in Figure 1.

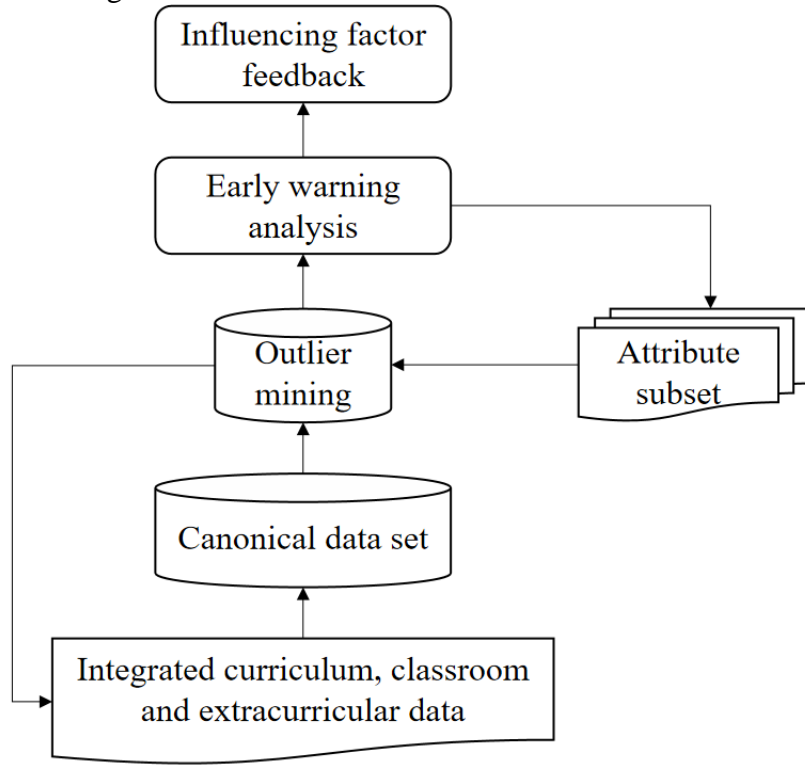


Figure 1 Academic early warning system model

The early warning analysis is based on the outlier mining result set O_m , assuming that there are k outlier objects, $O_m = \{p_1, p_2, \dots, p_k\}$. For each outlier data object p_i , find out its key attribute subspace $kas(p_i)$, which is a process of repeating the same outlier mining for attribute subsets.

The key attribute subspace of an outlier is a minimum dimension sub-attribute set. If the sub-attribute set is not included, the outlier object cannot be found. Otherwise, it can be understood that the key attribute subspace plays a key role in the outlier of the data.

On the other hand, academic early warning is a dynamic environment, and early warning needs to be made step by step according to time series data. The data at the next time point after data updating is used for the same outlier mining and analysis, and another outlier result data set $O'_m = \{p'_1, p'_2, \dots, p'_k\}$ and corresponding key attribute subspace $kas(p'_i)$, attribute or factor influence degree $c'_j/k, i=1,2,\dots,k, j=1,2,\dots,m$ are obtained. We can analyze the similarity from cluster

O'_m, O_m , that is, how many outlier objects are the same.

Obviously, if an object is outlier in both tests, that is, the abnormality continues to appear, it shows that there may be a crisis in the corresponding studies of this data object. It can also analyze the change of the influence degree of an attribute with time sequence, and provide it to teachers and students as an output result.

4.2. Construct an academic early warning and assistance system

The academic early warning and assistance system involves the close cooperation of colleges, academic affairs departments, student departments, teachers and parents, so it is necessary to build an organizational system with strong leadership and effective implementation. According to the specific situation of the college, an executive team should be set up, which is under the responsibility of the secretary in charge and the dean, with teaching management personnel, student counselors and teachers as the mainstay, and with the participation of psychological counseling teachers, student cadres and parents.

The educational administration department monitors students' academic status with the help of computer software, and can also notify them in the form of written letters with the help of the digital information platform of the school. After receiving the early warning information, the student management department should consult with parents, teachers and other personnel in a timely manner, formulate assistance strategies, and then implement ideological education, psychological counseling and academic assistance respectively. The assistance work involves a wide range of tasks, so special staff should be responsible for liaison, and relevant departments should record and track the results to facilitate monitoring and evaluation.

After obtaining the list of academic early warning, counselors should have a discussion with the students who have received early warning at the first time, learn about their study and living conditions through their classmates and roommates, and formulate different help measures according to different situations. For students with physical and psychological barriers or other problems, they should contact the school psychological counseling center in time and put forward counseling programs to promote the healthy development of students' body and mind.

Schools can also make full use of some existing evaluation systems to promote the conversion rate of early warning students: for example, take the conversion rate of early warning students as one of the reference conditions for selecting excellent class groups, counselors and class teachers.

4.3. Perfection and improvement

Big data technology can collect data that could not be obtained in the past or was very expensive to obtain, and it can be easily used in teaching process analysis, so as to fully improve academic performance, teaching level and management ability. Big data technology will have a revolutionary and tremendous impact in the field of education [8]. However, the goal of education is people's growth, which is to educate and cultivate people to use a relatively mature or rational thinking to recognize things. This process is so complicated and unpredictable that no matter how exquisite and perfect the learning analysis technology supported by educational big data is, the past data will be used to predict the future development, and the growth of people cannot be completely determined by the blunt figures in the past.

OBE system finally emphasizes "the success of all students and teachers". Or how many students can succeed, or how much they can learn and how fast they can make progress, there is no pre-set limit. Therefore, it is reflected in OBE system for two purposes: First, ensure that all students can acquire the knowledge, ability and professional quality needed for future careers when they graduate; The second is to structure and control schools so that those results can be achieved by all students.

Schools must meet three conditions when implementing the results-oriented education model, which are:

(1) All students can study at different times or in different ways according to their own characteristics, but the final result can reach the pre-assumed learning result, that is, all students can

learn successfully;

(2) A successful study experience is to lay the foundation for the next successful study and promote more successful study;

(3) In order to promote students' success in learning, school teachers control and decide these conditions for success [9].

Since 2017, continuous follow-up investigation has been carried out, and the mechanism of undergraduate academic early warning and graduation examination has been gradually studied. A linkage mechanism between teaching management and daily management of counselors has been initially established. By strengthening academic warning and graduation qualification examination for students of Grade 2018, the graduation rate and degree rate of this year reached a record high, and the graduation rate of materials major reached 100%, as shown in Figure 2.

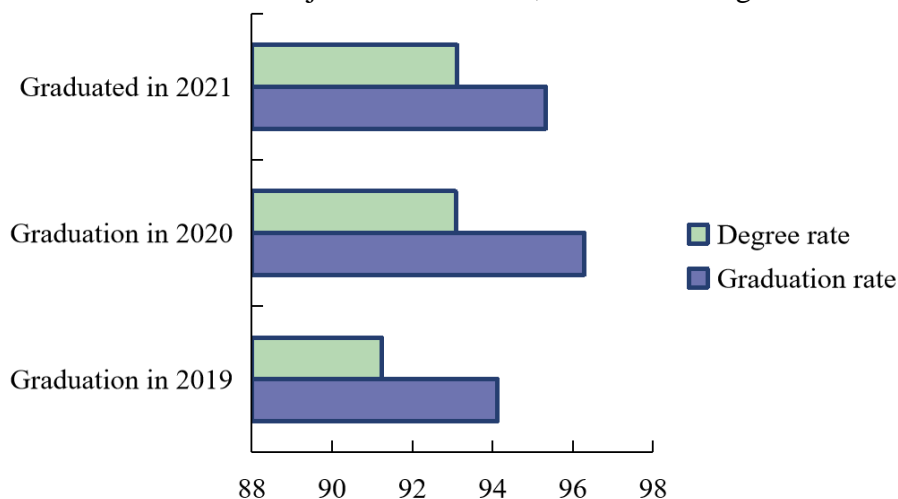


Figure 2 The first graduation rate and degree rate of graduates

In view of the high rate of academic warning and advice, low graduation rate and degree rate in the past, combined with professional characteristics, the "focus" on academic warning and advice will be changed into "prevention" in the early stage, the work will be advanced, refined and warned, and the teaching management will be combined with the daily management of counselors to form a multi-party linkage, thus reducing the rate of academic warning and advice, improving the graduation rate and degree rate, and enhancing students' employment and competitiveness.

5. Conclusions

The early warning mechanism of students' studies is a very practical and new management mode of university management, and the early warning management of students' studies is a continuous, long-term and complex work. We should help students turn early warning into opportunity, crisis into motivation, get warning from crisis and grow from early warning. OBE theory is a necessary choice to solve the disadvantages of early warning and prevention mechanism of university studies. This academic early warning and prevention mechanism, which combines the trinity and multi-party cooperation with OBE, is an innovation of the curriculum itself. The curriculum system needs to be constantly improved in teaching. This kind of experiential teaching, the point summary of students' learning process and the construction of dynamic evaluation system are also worth popularizing in the construction of literature courses in other applied universities.

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