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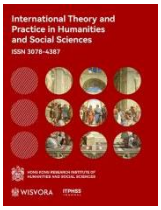

Developing an Intelligent Educational Management Platform for Universities: Utilizing Behavioral Data Analysis for Foreign Students in China

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Abstract

With the increasing internationalization of China's higher education, foreign students growing year by year and university teaching management facing cultural collision and learning difficulties with different learning habits.Drawing from certain behavioral data of international students in China, this article proposes the creation of a smart teaching management platform, explores the notion of a platform design plan, technical pathway, and its practical significance, three types of behavior data models and clustering for learning, living, and social data, and emphasizes that platform application can enable accurate delivery of educational resources, tailored academic suggestions, early learning alerts, and cultural assimilation. We think that it can improve teaching management level, improve foreign students' satisfaction, and help the goal of internationalization of higher education.

1. Introduction

Through the Belt and Road Initiative, collaboration with universities across various nations is prevalent, and the origins of international students are diverse.Students from Southeast Asia, Africa, and Central Asia are increasingly forming the primary group of international students in China. However, significant variations in language skills, study techniques, and communication present challenges for these students in adapting to the diverse developmental requirements of conventional "extensive" educational and administrative approaches (Cao et al., 2024). Therefore, higher education institutions must implement an information-based teaching management system to achieve the necessary outcomes. intelligent process, so that foreign students are better understand and adapt to the behavior characteristics, to promote personnel training service and internationalization strategy to go hand in hand.

Over the past few years, as China has progressively opened up, the quantity of students

pursuing education there has risen annually. Currently, Chinese colleges and universities have enrolled over 500,000 international students .International students contribute fresh perspectives to the academic and educational environment of Chinese higher education institutions, introduce global culture and international viewpoints, and pose greater challenges for curriculum development, faculty training, academic advising, and other areas of educational management (Cao et al., 2024). The characteristics of foreign students such as study habits, complex culture background, language adaptation difficulties have become the burden of domestic university management.

As big data and AI technology continue to advance swiftly, utilizing various behavioral data from students throughout their time in school is an excellent method to enhance teaching management in higher education institutions, boost the quality of educational services, and elevate service standards (Fan, 2024). In contrast to static evaluation, dynamic monitoring analysis of behavior data can provide dynamic and real time analysis of students, so that students can recognize and find students problem in time, propose targeted intervention, and improve teaching accuracy and student satisfaction (Hu & Li, 2024).This paper will explore possible paths and implementation methods of intelligent teaching management platform for modeling and applied behavior data of foreign students in china, providing theoretical and practical support for teaching management and talent cultivation of foreign students in colleges and universities.

2. Literature Review

Behavior data analysis could also be applied to the educational management system, providing student learning or decision making support. As claimed in Arizmendi et al.(2023) and Du et al.(2023), the digital learning trace can help predict student learning outcomes and discover students' self-regulated learning behaviors. For instance, students' participation in online discussion, online homework or online assignments submitted in LMS can be analyzed to predict their scores in exams. Besides, the LMS could be also used for learning analytics. For instance, Arqoub et al.(2022) and Veluvali & Surisetti(2022) claimed that learning analytics helps improve student engagement and teaching effectiveness. Many kinds of low student engagement problems can be discovered from analysis of students' learning behavior data on online learning platforms. Many kind of targeted teaching strategies can be selected and used to improve their engagement level and enhance their learning effectiveness.

The importance of international students in behavioral data is obvious. Cao et al.(2024) showed that online communication (e.g. WeChat usage) influence engagement and cultural adaptation among China students. AI applications will further enhance assistance to international students by improving platform intelligence. Fan (2024) and Hu and Li (2024) use neural networks and deep learning techniques to improve learning and management from behavioral data. They support the analysis of behavioral data of international students.

Ni et al.2023, Sharma et al.2023, suggest using data models to predict student performance and early intervention in education. Students can detect problems early by looking at their past data, behavior patterns and target interventions. Cho et al.2023, suggest that learning environments can be improved by tailoring learning behavior characteristics to different subject areas.

Although some progress has been made, few platforms are focused on China students. We propose intelligent education management platform based on student behavior information to help China students succeed academically. Our education platform does not take into account special needs and behavior characteristics of China students.For example, our smart education management system offers customized learning recommendations and support based on the study

habits and cognitive styles of Chinese students, along with bespoke academic planning for them. This is the concrete application of behavior information utilization proposed by us in intelligent education management. By analyzing students learning behavior and performance, intelligent education management platform provides personalized learning support and guidance for China students.

3. Methodology and Procedures

3.1 Platform Construction Objectives and Application Value

The platform measures group of poor grades students in blue, yellow, red. Universities can help and support each student according to the result, targeting support. The platform also tracks international students arrivals and integration by acculturation coordinates, providing quantitative information on acculturation for universities.

The main goals of the platform construction are as follows:

Intelligent platform is a teaching management tool with data collection, statistical analysis and decision support functions, which can collect students learning data, behavior data and teaching feedback. Data analysis generates statistical reports and helps teachers and managers make teaching and management decisions (Veluvali and Surisetti, 2022).

Personalized education services are learning profiles constructed by adaptive learning profiles and learning materials and tutoring extracurricular hours to suit the individual learning needs of each student (Hu and Li 2024). Learning plans and tutoring can be customized according to student's learning styles, interests and learning level.For example, students are given learning materials and tutoring for different disciplines according to their expertise to meet their specific needs.

This acculturation module aims to facilitate international students to be able to integrate into China through cultural activities (Cao et al. 2024). This means that by organizing various cultural activities international students can better understand China culture. For example, China traditional festival celebration activities are held to allow international students to experience China culture first-hand, and integrate into local society. Cultural activities covers all kinds of traditional cultural experience activities like lectures on China culture, handicraft making etc.

3.2 Platform Design Principles and Architecture

Our platform is based on five principles: data driven intelligence, user centric design, modularity, openness, adaptive integration with existing universities. Data driven intelligence employs big data and artificial intelligence to make intelligent decision, personalized recommend, customized service for user (for example personalized recommend, personalized service for user) through user behavior and preference analysis. User centered design is oriented toward user experience, product and service design according to user need and user satisfied degree. Modularity divides the functions and services of the platform into modules separately, combining, customizing quickly and flexibly, such as building personalized teaching management system according to different schools requirements with modular design. Openness is the platform interface and access is opened to the external systems and data, data docking and sharing with the other system, information fluency and work efficiency.Adaptive integration is that the platform can be combined into existing university management system and teaching system, improving the system overall efficiency.

The platform features a three-layer architecture:

The perceptional data layer refers to data of the students' behaviors from multiple different sources like virtual learning platform, campus card system, dormitory traffic record and social

media activity. These information can be leveraged to establish behavior profiles for international students, and help the schools to gain understanding of student behavior patterns and activity level, e.g., via the study of the data of campus card system, schools can learn about student activities and spending habits on campus, which might assist their campus service and campus management improvement efforts.

Module engines for evaluating academic performance, tracking the cross-cultural adaptability, providing personalized resources and recommending engagement patterns. Analytical logic layer consists of modular engines that evaluate academic performance, track cross-cultural adaptability, provide personalized resources and recommendations based on engagement patterns, for example, quantification assessment modules for academic performance, tracking modules for cross-cultural adaptability, matching modules for personalized resources, etc., through which participating trends are evaluated and recommended. The cross-cultural adaptation denotes a person's ability to behave, understand or relate differently in each culture, environment or system. Tracking the cross-cultural adaptability is to provide personalized resources and recommendations.

The user interface layer provides personalized feedback and intervention alerts to users via web and mobile channels, supporting dynamic communication and real-time optimization of services on the input of user input.For example, after recording a day's diet and exercise on fitness App, the user interface layer can provide personalized nutrition advice and fitness programs to users on the input of user input and real-time intervention.Personalized feedback is feedback tailored to user's situation, such as too little aerobic activity or too little protein intake.

To guarantee the data exchange encryption, open APIs, finegrained access control (Du et al. 2023).The data exchange encryption is for protecting the confidential information from being illegally accessed, the open APIs are for facilitating the information sharing and interoperability for different educational systems, and the detailed access control is to ensure that only authorized users can access to the educational data/resources. For example, a international online education portal needs to provide students and teachers in different countries the capability to share data/resource, the data exchange encryption and fine-grained access control can help to support the request.

3.3 Research Methods

Qualitative data and quantitative data were both adopted to review the platform design and behavior. Qualitative data were collected through interviewing educators and students (Hu and Li, 2024). To obtain qualitative data, users and users were surveyed and tested for analyzing their satisfaction of the platform and its UI interface design etc. Quantitative data were obtained from users, through questionnaires and examinations to quantitatively review whether the Platform attained desired teaching/learning outcomes. Together with the two types of data, effects of platform and users satisfaction were measured in a more comprehensive manner.

In general, machine learning algorithms can analyze student educational data to predict difficult topics students may struggle and design personal teaching methods for the student. Data analysis tools can also recognize the pattern and trend of student learning and adjust the teaching content appropriately (Sharma et al., 2023), such as finding that the student has made many mistakes in math learning, using machine learning algorithms to discover the trend and then adopting targeted teaching methods to assist the student to defeat difficulties.

4. Results and Discussion

4.1 Practical Paths and Promotion Suggestions

The intelligent teaching management platform leverages students 'behavior data for prediction

and intervention to assist teachers in comprehending students learning status and needs. Student behavior data mining based prediction and intervention can identify students who require more help (i.e., student learning difficulties, or mental maladjustments) and provide them with help and support. Blue Alert system can predict potential students with potential abnormal behaviors (e.g., learning difficulties, mental stress), so teachers could provide supports and assistance immediately. The academic performance and students satisfaction have significantly improved and this strategy provides an early warning mechanism that schools could pay more attention for the student learning and life status and provide more targeted helps.

College students adapting coordinate system allows students to adapt to China culture.Adaptive coordinate system can be seen as guide for students to adapt gradually upon arrival and can give insights into cultural adaptation for universities. In particular, it can help universities plan cultural adjustment activities and support programs such as Chinese language workshops, cultural exchange activities and mentor programs to help students adapt to China culture. According to Cao et al.(2024), cultural adjustment activities help students establish a supportive culture atmosphere on campus.

Teaching management system supports automatic data collection and reporting. Using teaching management system teachers could acquire the information of teaching effect and teaching resource consumption conveniently, making teaching administrators to know the status of teaching clearly and make decision. Teaching resource allocation would be adjusted according to analysis of data.

Students' feedback on personalized learning services: feedback about personalized learning services are generally optimistic because students' educational resources and recommender contents are different and personalized by students' learning behavior, which is particularly important for overseas students just getting used to the new environment (Hu & Li 2024). Personalized learning services provide personalized teaching resources and recommended content based on students' learning needs and preferences, which may elevate students' learning motivations and the learning performance. Video teaching resources may be preferred to multimedia learner students while text materials may be preferred to reading students. Recommended learning service may help overseas students adapting more quickly and effectively to academic learning environments which results in better students' performance.

The platform has been promoted widely and received positive feedback from international students and positive comments on quality and internationalization of education. Students commented positively on varied curriculum and international teaching environment offered by platform, and also extended to other universities and offered training and support to faculty and staff (Veluvali and Surisetti,2022). Positive evaluation of varied curriculum and international teaching environment indicates the platform is attractive to international students and educational quality.

4.2 Theoretical and Practical Implications

Modelling behavior data can offer new learning and adjustment insights for international students and incorporating data driven techniques with intercultural education, the education of international students should be further (Arizmendi et al 2023; Cao et al 2024). For example, studying learning behavior data of international students can offer them greater insight into educational preference and requirements in various cultural backgrounds to guide teaching and supporting strategies, to offer them personalized education and promote the learning outcomes of international students.

The platform is suitable for universities with international goals and can accommodate universities of different sizes, from large universities to small colleges (Du et al.2023).

World-class universities and small colleges can use the platform for international development. It covers many areas and can meet different institutions' needs.

Furthermore, the platform shows the significance of cultural adapting and personalized instruction. For instance, the platform supplies acculturation aids and resources for those international students as needed to confront the cultural and academics obstacles (Sharma et al., 2023). Personalized instruction means teaching and support based on each individual's need. With regards to acculturation, the schools could offer acculturation courses and resources for international students to make them adapt their brand-new environment faster. Personalized help can also provide tutoring and guidance for various disciplines so that more aids could be offered.

4.3 Future Work

Future work will comprise optimisation of platform data analytics algorithms that take benefit of the new features, including artificial intelligence and machine learning for predicting student performance and recommending what should be taught next; cultural adaptation modules, for example based on virtual reality experiences and language learning (Kühl et al., 2022).

Other studies could be made on how the platform could be implemented in various educational contexts. e.g. it could be applied to provide adaptive learning support for students in local learning environments based on students' learning habits and demands. Regarding collaboration, it could facilitate collaboration and collaborative learning among cultures. Data-driven solutions may ease solving various educational challenges of worldwide institutions (Fan 2024). That is, by analysing real case cases in various educational contexts, the platform could be demonstrated better.

5. Conclusion and Suggestion

We researched intelligent education management system based on behavioral data collection, not only used it as simple data management tool but also used it as data managers to become decision maker. Universities can utilize the system to collect the data, evaluate student fit, carry out targeted educational research, improve resource allocation and decision. Universities can utilize the system to get scientifically organized and thorough data support and better respond to quality control requirements and educational globalization issues. Universities can utilize data driven approach to better know students and improve teaching and resource allocation according to data. Ni et al. (2023) also researched that data driven management system can be applied to scientifically and efficiently improve university education. Universities can utilize student learning behavior data such as learning habits, academic performance, learning interests, etc., better grasp students learning situation and adjust curriculum design and resource allocation to improve teaching effectiveness.

As a goal, universities need to enhance employees' data literacy training, data security and ethical reviews(Qian, 202). Mining and research analysis on foreign students' behavior data can finally realize using artificial intelligence and virtual reality technology to upgrade modernized and internationalized Chinese university education and enhance the application efficiency and the user experience.

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