Campus Learning Mutual Aid Platform Based on O2o Model

Shen Chao[1], Lei Yuanpeng[1], Ruan Jianing[1], Yu Hang[2,a,*]

[1]College of Medical Technology, Qiqihar Medical University, Qiqihar, Heilongjiang, China

[2]The Second Affiliated Hospital of Qiqihar Medical University, Qiqihar, Heilongjiang, China

*Corresponding Author:[a] yh@qmu.edu.cn

Keywords: O2o model, Campus learning mutual aid platform, User behavior analysis

Abstract: With the popularization of smart handheld terminals such as smart phones and tablet computers, the mobile learning model has become one of the directions for future education development. The "Progress and Worry-Free" App is a learning mutual aid platform for college students, which allows students to combine learning with social interaction, without losing sight of one another. The platform mainly uses the construction of O2O business model to provide college students with C2C and B2C multiple service methods, create their own spiritual home for college students in the Internet era, and establish online-offline, offline-online learning mutual assistance channels. The App design of the product platform is divided into two versions: IOS system and Android system. In order to facilitate the login, it can also be connected with the WeChat applet. The interface design is guided by a simple and clear style, and is divided into three parts: user center, product function and software feedback. Campus students find like-minded students to make progress together through the App platform; the App platform introduces academic masters, specialized research groups, and scientific research teams with technical expertise as a platform for business display. Through mutual help and mutual assistance in professional skills, college students complete efficient and useful social interactions, thereby improving the overall academic and scientific research level of the campus.

1. Introduction

With the rapid popularization of smart terminals, the 4G and 5G modes have become more mature, and the coverage of WIFI has gradually increased [1]. These changes have provided a good growth foundation and hardware guarantee for the development of the mobile Internet. While the mobile Internet is changing people's lifestyles more and more, the huge changes in business models that are bred are also closely watched by the Internet and traditional enterprises. For such an opportunity that will subvert the existing business landscape, it is a mobile Internet for small and medium-sized enterprises [2]. Strategic deployment provides a valuable focus. Various group buying websites are the first to test the O2O model, attract users through online affordable products or services, and achieve online purchases to lead them to offline consumption. However, due to the large variety of products in the group buying model, it is not easy to sustainably develop and maintain customer loyalty, it can only provide companies with a means to increase visibility and sales in the short term. In the long run, the sustainable O2O learning mutual aid model of "live online, enjoy offline" is more worthy of thinking and research.

The Wireless Andrew (Handheld Andrew) research project carried out by Carnegie Mellon University in the United States is the first research project on mobile learning. Immediately afterwards, other economically developed countries, especially Europe and North America, have also begun mobile learning research, and the scope of the research has become more and more extensive, and the content of the research has become more and more in-depth [3]. The University of Birmingham in the United Kingdom is aimed at a mobile phone project for medical and unemployed training, a collaborative learning project in a museum environment in Norway, a mobile learning project in rural Africa, a "mobile literacy project" in rural Pakistan, and a second language for children in Germany. These projects involve groups of different ages, genders, and

  DOI: 10.25236/acetl.2021.107

occupations, reaching all levels of education [4]. The content of the research is also very detailed. The research focus of mobile learning includes the research of mobile learning environment, the development of mobile learning resources, the research of personalized learning, the research of enhancing teacher-student interaction, the research of collaborative learning, etc. The Modern Education Center started our country's first mobile learning project-mobile education theory and practice [5]. The project is dedicated to the research of mobile learning resources, and finally established a “mobile education” information network and a “mobile education” service station system [6]. The former provides various information services on campus to teachers and students through the SMS platform of China Mobile, while the latter provides various services for participating users by establishing “mobile education” service stations in participating universities.

This article analyzes the current development status and existing problems of mobile learning construction in the digital campus environment, and points out the feasibility and practicality of building a mobile learning service platform. On this basis, we conducted investigations and interviews with students, and designed a cognitive student model based on student behavior analysis in accordance with student needs. Adopting multiple linear regression methods and data mining cluster analysis technology can deeply dig out students' preferences and provide them with personalized course learning mutual aid recommendation services. The cognitive student model subverts the past passive indoctrination learning method, fully considers the students' cognitive style and needs, and enhances the students' interest in learning.

2. Learning Mutual Aid Platform under O2o Mode

2.1 Adaptability Analysis of O2o Learning Mutual Aid Model

Different from the traditional business model, it must be the e-learning mutual aid model based on the Internet. The birth and development of e-learning mutual aid is a new transaction method that conforms to the development of society and technology. Compared with the traditional business model, the e-learning mutual aid model has transformed the carrier that connects both parties to the transaction from a physical store to an online platform. With the Internet's low-cost, efficient, and convenient characteristics, the e-learning mutual aid model brings convenience to consumers.

The transactions that exist under the e-learning mutual aid platform are no longer like the one-way push of information in the traditional mode. Consumers can also feed product evaluations to the operators through the e-learning mutual aid platform, and can also share their needs and preferences through the platform. These consumption and feedback information will guide operators to better serve users, and they can also obtain more profits. With the rapid increase in sales under the B2C and C2C models of vertical e-commerce and platform e-commerce, and the rapid spread of mobile Internet, the O2O e-learning mutual assistance model has become a new blue ocean for business development.

Under the O2O model, consumption data is deposited in the background. These data are valuable user resources. For merchants who carry out user relationship marketing management and implement precision marketing, it is undoubtedly an effective way to find marketing forces and increase product sales. The O2O model for businesses has several advantages such as the above are based on the use of huge consumers. If the O2O platform does not have enough users, this learning mutual assistance model is obviously difficult to develop. A very high and a certain percentage of students already have a psychology of dependence, including the increasing percentage of online purchases year by year, indicating that the O2O model has mature conditions for the development of campuses. The system architecture of the campus learning mutual aid platform based on the O2O model is shown in Figure 1.

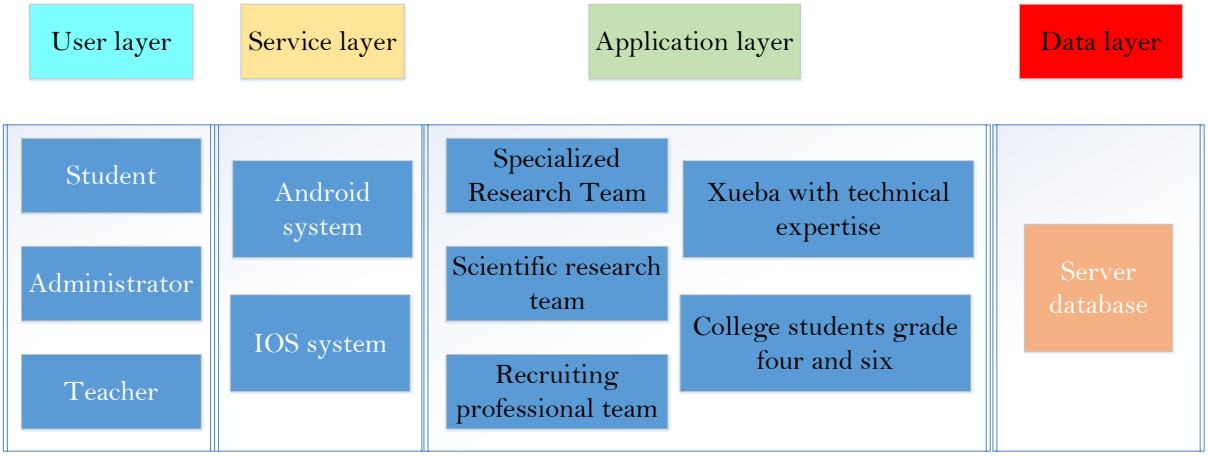

Fig.1 System Architecture of Campus Learning Mutual Aid Platform Based on O2o Model

2.2 Research on the Cognitive Student Model

The essence of the student's learning process is the process of actively forming external knowledge into a self-cognition structure. This is the viewpoint advocated by cognitive school learning theory. Human cognitive activity is a mixture of external stimuli and internal psychological processes of the cognitive subject. The result is not directly given or instilled by external stimuli. The learning process is essentially a problem-solving process, that is, using one's existing knowledge to think, reason and solve problems. Based on this theory, this paper constructs a complete cognitive student model suitable for mobile learning. First, they learn student needs from the student model, obtain student interest resources, and then recommend the obtained interest resources to learn mutual assistance to students for personalization. Students are no longer the passive grantors of external information, but active participants who actively select and process external information. The model is divided into two parts. The first part is the data collection and preprocessing module of the student model. The data includes static library, dynamic library and other information. The information that learners complete by registering or filling in interest information questionnaires belongs to static library information. The dynamic student database stores the students' learning history courses, test scores, course attendance and other information. When a student enters the system for the first time, it will automatically link the stored data of related users according to the personal information filled in by the student, establish the student's default initial model and store it in the form of UML documents.

The second part is the management service of the student model, including log file processing and data mining and decision-making. The personal data of the student is often recorded in the server log file. Useful information mining, preprocessing, analysis and modeling are performed from these data to obtain interest resources, and provide real-time, personalized learning mutual aid recommendation service. In this way, some preferences of users can be obtained without active investigation. Log data must be pre-processed before accurately mining user interest data in order to meet the specific conditions to be mined. In order to ensure the accuracy of the mining results and improve user acceptance, implicit mining is usually used. This article will use log mining to obtain user interest resource demand information. The log file of the database records the relevant information of each student each time, and the cognitive student model is established through the session update data. Cognitive campus student learning mutual aid model is shown in Figure 2.

When a learner registers as a user on the system, the system will record the student's registration information and store it in the database. This article divides student behavior information into two categories. The first category is static information that can be directly obtained. Static information is completed by learners through information registration or by filling in questionnaires. This method is the most direct way to obtain students' interests and needs, but the disadvantage is that the acquisition of data depends on the active provision of students, and students are generally unwilling to spend time to fill in carefully, which greatly reduces the usability. The second category is the dynamic information obtained indirectly. The dynamic information includes information such as the

student's study history, study time or attendance rate, and test results. Therefore, this article divides students into two types: new users and old users. Old users have their own course records. The system reads students' dynamic information through the student behavior information database, such as course selection records, attendance rate, test results, etc. Data processing and mining of this information will finally provide personalized course learning mutual aid recommendation. New users do not have dynamic behavior information. The system provides questionnaire surveys and information registration functions. According to the static data filled in by students, they evaluate their interest courses and provide learning mutual aid recommendation services.

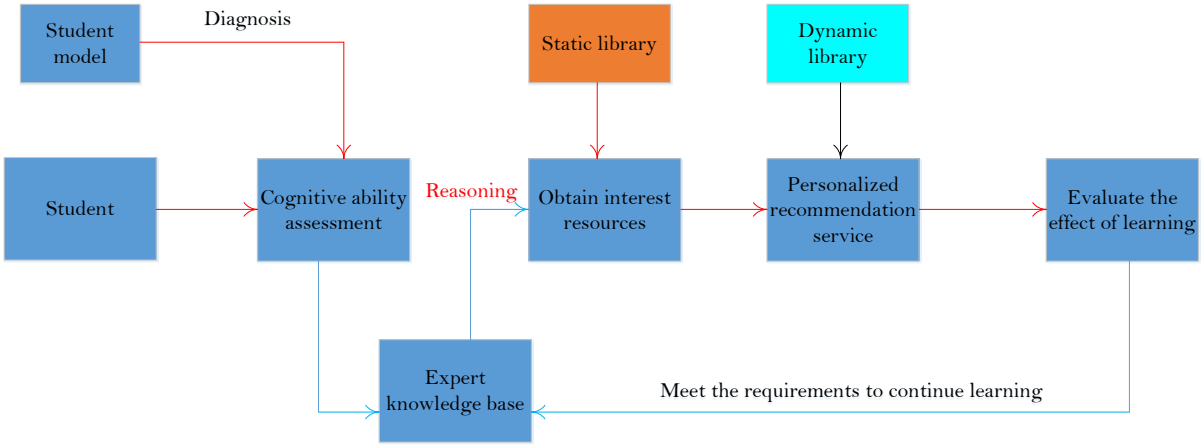

Fig.2 Cognitive Campus Student Learning Mutual Aid Model

2.3 Curriculum Interest Modeling

To a certain extent, the behavioral activities performed by students in the learning process is an external manifestation of their psychological activities. Mental activities can also be understood as the degree of interest in the course. We might as well understand their psychological activities as whether they are interested in a certain course. This hypothesis is that the various behavioral characteristics of students in learning jointly determine the degree of interest in the course, and there is a certain linear relationship between these related factors. A large number of investigations and experimental analysis are used to verify whether this assumption is true.

Multiple linear regression analysis is a multiple statistical analysis method that uses a set of independent variables (related variables of student behavior information). After using multiple linear regression analysis methods, the estimated value and change trend of the course interest variable can provide a theoretical basis for the design of the mutual aid recommendation function of personalized course learning for this subject.

Assuming that there are r independent variables z (relevant variables representing user behavior information), let them have a certain linear relationship with a dependent variable Y (course interest). The multiple linear regression analysis model assumes that Y is composed of a mean (a continuous function of mean z) and a random error ε (representing the results of measurement errors and other variables that are not explicitly considered). The linear regression model representing the dependent variable of the interest of the course takes the following form:

$$y = \beta_0 + \beta_1 z_1 + \beta_2 z_2 + \ldots + \beta_r z_r + \varepsilon \qquad (1)$$

Among them, y is the dependent variable, z is the dependent variable, β is the regression coefficient, and ε is the random error variable.

In order to solve the regression coefficients, the least square method is usually used to solve the relevant parameters to ensure that the sum of squares of the error between the data obtained by the formula and the actual data is minimized. Now suppose there are n groups of sample observation values y_i, where i=1, 2,...,n. According to the multiple linear regression equation, a set of equations can be obtained:

$$\begin{cases} y_1 = \beta_0 + \beta_1 z_{11} + \beta_2 z_{12} + ... + \beta_r z_{1r} + \varepsilon \\ y_2 = \beta_0 + \beta_1 z_{21} + \beta_2 z_{22} + ... + \beta_r z_{2r} + \varepsilon \\ \cdots \\ y_n = \beta_0 + \beta_1 z_{n1} + \beta_2 z_{n2} + ... + \beta_r z_{nr} + \varepsilon \end{cases} \quad (2)$$

Each student has its own behavioral characteristics, such as attendance rate, test scores, and preference for teachers. And everyone's course interest is based on these characteristic attributes.

3. System Platform Test Analysis

3.1 Analysis of User Behavior Results

There are a number of public elective courses in each semester, covering many fields such as liberal arts, sciences, engineering, finance, medicine, art, health and wellness. The large cross-field and cross-disciplinary lineup of elective courses provides students with sufficient choices and rich teaching resources, enriches students' study life and broadens their horizons. In order to better understand the teaching quality and learning effects of the elective courses offered by Northeast Petroleum University, as well as to grasp the views, attitudes and suggestions of most students in elective courses, this topic uses questionnaires to conduct in-depth investigations and interviews.

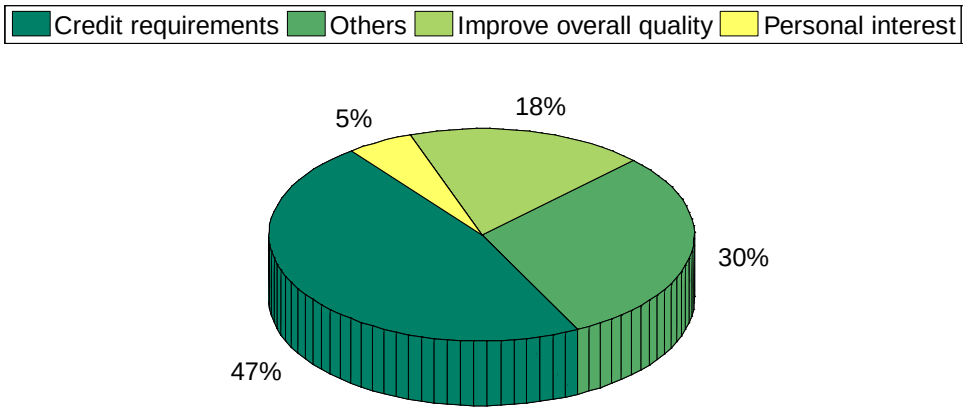

Fig.3 Statistics Chart Based on the Survey of Course Selection

From the statistics shown in Figure 3, it can be seen that only 5% of students choose courses based on their personal interest in elective courses. Most of the remaining students do not start from the heart and use their own initiative to select courses. The proportion of credits required as the basis for selecting courses is 47%, which shows that the credits of elective courses have a great influence on the course selection of students. The ratio of low attendance requirements, easy examinations, and other factors such as teacher preference is 30%. In addition, 18% of students are considering comprehensively improving their overall quality before making their choice. The selection criteria of students vary greatly. Some students choose courses for personal interest or to satisfy curiosity, while others choose courses that are easy to pass or get high marks. This utilitarian purpose is to have a good graduation. There are also students who want to adjust the flexibility of class time and allocate their free time to unimportant elective courses evenly. It can be concluded that the course chosen by students may not be the course they really like. Course selection will be affected by various factors such as test scores, teaching time, and teacher scoring. However, most students did not give full play to their personal initiative to choose courses from their hearts.

3.2 Analysis of the Results of Course Interest

In order to test the correctness of the model, 10 other students were randomly selected, their behavioral characteristic data were processed, and their interest in campus learning mutual aid was calculated using the equation obtained, and compared with the estimated curriculum interest. The analysis results are shown in Figure 4.

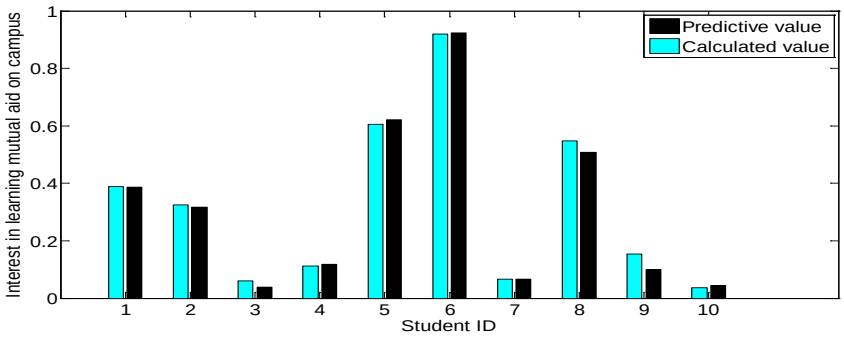

Fig.4 Interest in Learning Mutual Assistance on Campus

The result of mutual aid interest in campus learning calculated from Figure 4 is very close to the result of the estimated curriculum interest. This shows that the student's course interest calculated by the regression model is more consistent with the estimated course interest, and it is verified that the regression model is used to calculate the reasonableness and accuracy of students' interest in learning mutual assistance on campus.

4. Conclusion

In this paper, a large number of investigations and structural analysis have been conducted on the campus mobile learning service App, and a personalized course learning mutual aid recommendation method based on linear regression model and cluster analysis algorithm is proposed. The combination of data mining technology and linear regression model is introduced into the personalized course learning mutual aid recommendation. We establish a course study mutual aid recommendation mechanism for students, so that students no longer need to choose courses randomly based on subjective assumptions. The establishment of this system hopes to be a reference for the students' most preferred courses; the student's personal attendance rate and test scores and other behavioral information are used as the basis for the students' most preferred courses to study mutual aid recommendation. Experiments show that this method can accurately provide students with one-to-one course learning mutual aid recommendation services, effectively improve student learning efficiency and reduce students' blindness in course selection. This can provide convenient campus mobile learning services for students.

5. Acknowledgment

Heilongjiang Province 2020 innovation and entrepreneurship training program for university student: “Progress Without Worry” Learning Mutual Aid Platform (No. 202011230053)

References

[1] Lind, K. Mutual Aid During a Pandemic: A Group Work Class Example. Social Work with Groups, vol.43, no. 4, pp. 347-350, 2020.

[2] Dalton, L. C., Hajrasouliha, A. H., Riggs, W. W. State of the Art in Planning for College and University Campuses: Site Planning and Beyond. Journal of the American Planning Association, vol.84, no. 2, pp. 145-161, 2018.

[3] Florian, R. Hearing Aid Accompanying Smartphone Apps in Hearing Healthcare. A Systematic Review. Applied Medical Informatics., vol.42, no. 4, pp. 189-199, 2020.

[4] Kumar, V., Sharma, D. E-Learning Theories, Components, and Cloud Computing-Based Learning Platforms. International Journal of Web-Based Learning and Teaching Technologies (IJWLTT), vol.16, no. 3, pp. 1-16, 2021.

[5] Chiu, C. J., Tasi, W. C., Yang, W. L., et al. How to Help Older Adults Learn New Technology?

Results from a Multiple Case Research Interviewing the Internet Technology Instructors at the Senior Learning Center. Computers & Education, vol.129, pp. 61-70, 2019.

[6] Badillo-Urquiola, K., Chouhan, C., Chancellor, S., et al. Beyond Parental Control: Designing Adolescent Online Safety Apps using Value Sensitive Design. Journal of Adolescent Research, vol.35, no. 1, pp. 147-175, 2020.