



# Research on the Push of Online Teaching Resources for Innovation and Entrepreneurship Based on User Characteristics

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**Abstract.** One of the main reasons for the low extraction rate of online teaching resources is that push resources do not meet user needs. In order to improve the resource extraction rate of online teaching resource push, optimize the efficiency and quality of push, and achieve the ideal effect of teaching resource push, the principle of user characteristics analysis is introduced. Taking innovation and entrepreneurship courses as an example, the research on innovation and entrepreneurship online teaching resource push based on user characteristics is carried out. First, select online teaching resource filter encoder to obtain the characteristics of innovation and entrepreneurship online teaching resources. Secondly, design the frequency of online teaching resources push cycle and push presentation mode to lay a good foundation for online teaching resources push. In order to ensure the security of the storage of massive online teaching resources for innovation and entrepreneurship, a database of teaching resources is established. On this basis, using the user characteristics analysis method, this paper makes an objective analysis of the specific characteristics of the users who push online teaching resources for innovation and entrepreneurship. According to the user characteristics, it uses targeted personalized teaching resources push methods to achieve the goal of resource oriented push. The experimental analysis results show that after the application of the new push method, the resource extraction rate of the resource package has reached more than 97%, and the push effect has significant advantages.

**Keywords:** User characteristics · Innovation and entrepreneurship · Online teaching · Resources · Push

## 1 Introduction

In recent years, with the continuous development of “Internet + education” construction, China’s education has been constantly changing and innovating. With the development of the education industry in China, new online learning platforms are emerging on the network platform, which provides great convenience for learners to learn [1]. Due to the existence of massive learning resources on the online learning platform, learners are prone to learning disorientation, cognitive overload and fragmented learning in the

process of learning, resulting in the inability to fully master the learning curriculum. In this context, the concept of personalized learning has brought a new direction for the development of online learning platform [2].

The concept of push service first appeared in an article of American Information Weekly. This service comes from information recommendation research. Its main goal is to actively recommend resources to demanders. Knowledge push is defined as a network knowledge service mode. This technology has received extensive attention since it was proposed, and many organizations and individuals have invested in relevant research [3]. In the short term, it has achieved successful commercial applications, such as Dangdang, Amazon, eBay, Taobao, etc., which we are very familiar with. The successful application of the recommendation system in the above online business activities has promoted the continuous improvement of the recommendation algorithm, but so far there is no mature recommendation service for educational resources [4].

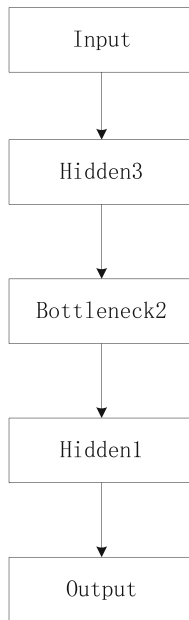
Push service provides a new mode and method for the acquisition of educational resources and the establishment of scientific research knowledge system under the network environment, and fundamentally changes people's means of information acquisition and learning [5]. Starting from the sharing level of educational resources, promote new ways for services to provide education, learning and scientific research. The active information service based on user interest changes the passive state of looking for information into the active learning mode of looking for information. The main forms of active information service include personalized recommendation, personalized retrieval, and personalized customization. The educational resources involved in this article are push services, which mainly involve personalized recommendation services. The former passive query of online education resources has been transformed into the active recommendation service of education resources [6].

In recent years, the state has attached great importance to innovation and entrepreneurship education, and application-oriented undergraduate universities have become the main force in cultivating innovative talents. The upsurge of innovation and entrepreneurship education is sweeping through application-oriented undergraduate colleges. Innovation and entrepreneurship courses play an important role in the process of cultivating innovative and entrepreneurial talents in colleges and universities. However, the current curriculum construction is not yet mature, the innovation and entrepreneurship curriculum system is not yet perfect, and the online teaching resource push method is not mature enough to achieve the best effect of innovation and entrepreneurship teaching. User feature analysis can improve the above problems, which means that it can be used in the user groups facing our product design to analyze the typical user characteristics, understand the situation of target user groups, describe the typical target users, understand their group behavior, clearly know the user demands, and provide the core effect basis for the design of function points. Based on this, this paper puts forward the research on online teaching resource push of innovation and entrepreneurship based on user characteristics.

## 2 Research on the Push of Online Teaching Resources for Innovation and Entrepreneurship

### 2.1 Select Online Teaching Resources to Filter Encoder

In the online teaching resource push method of innovation and entrepreneurship based on user characteristics designed in this paper, first, simulate the real teaching environment of innovation and entrepreneurship courses to generate a teaching resource dataset. It is stored in the data warehouse in the form of JavaScript Object Notation (JSON). Secondly, the curriculum relationship chain is generated according to the students' learning behavior to further describe the characteristics of the existence of resources. Finally, open the online teaching platform and use the crawler technology to process the resource data. If the data filtered out at this time is missing, you can use the user data file to fill in, so as to obtain the correlation between the data [7]. Combining the above steps, online course teaching resource filter encoder can be generated, as shown in Fig. 1.



**Fig. 1.** Online course teaching resource filter encoder

It can be seen from Fig. 1 that the online course resource filtering encoder can use the hidden function to carry out vector mapping, activate the internal coding space, and obtain the final resource collection result. The calculation formula of the descriptive formula  $y$  is:

$$y = f(qX + c) \quad (1)$$

Among them,  $f$  Represents the activation function of online teaching resources for innovation and entrepreneurship;  $q$  Represents the encoder weight;  $X$  Represents the

description offset;  $c$  Represents hiding input vectors. It can be decoded by combining the above calculated values  $x_i$  The calculation formula of is:

$$x_i = f(q_i X + c_2) \quad (2)$$

Among them,  $q_i$  Represents decoding weight;  $c_2$  Represents the decoding offset. At this point, you can generate a loss function that meets the resource push requirements  $Q$ , the calculation formula is:

$$Q = \sum_{i=1}^M \|x_i - y\|^2 \quad (3)$$

where,  $M$  Represents the number of learners. If the loss value of the resource collection encoder is too high, it needs to perform linear interactive processing to generate the final resource representation vector  $k$ , the calculation formula is:

$$k = \text{soft max}(wq_i + c_2) \quad (4)$$

Among them,  $w$  Indicates the resource attention parameter. Using the above resource representation vector, we can effectively obtain the characteristics of online teaching resources for innovation and entrepreneurship, and then achieve effective filtering of online teaching resources.

## 2.2 Frequency Design of Online Teaching Resources Push Cycle

In the implementation process of push, researchers and teachers need to design and control the cycle frequency and presentation mode of personalized online teaching resources to provide basic support for subsequent resource push.

The frequency of the push cycle of personalized online teaching resources is determined by the teacher according to the teaching needs. This paper suggests that the teacher provide the prepared subject test after each new lesson. Input the test data into the push system, and the push system will automatically provide personalized online teaching resources for learners. For other courses, such as review lessons and exercise lessons, teachers should decide whether to provide personalized online teaching resources to students according to teaching needs [8]. Although it is possible to push personalized learning resources supported by computer technology, in the field of basic education, the popularity of computers and mobile devices is still relatively low. Most schools and parents do not support students to use electronic devices for learning, which has caused some obstacles to our personalized online teaching resources push [9]. Therefore, in the actual teaching process, the push cycle frequency of personalized online teaching resources is determined by the cycle frequency of student evaluation data collection. According to the teaching needs, the teacher prepares the subject test in the system before class, prints it into paper version, and distributes the test to students after class. After retrieving the student evaluation data, input the data into the push system, and provide students with personalized online teaching resources output by the system within 12 h.

### 2.3 Design of Online Teaching Resources Push Presentation Mode

After completing the design of the frequency of online teaching resources push cycle, the next step is to comprehensively design the presentation mode of teaching resources push.

In order to ensure that learners can obtain personalized online teaching resources, this paper provides learners with two presentation methods, electronic version and paper version. If students have electronic equipment, they can directly access electronic personalized online teaching resources on the equipment, and can quickly obtain feedback results of consolidation exercises. If students are boarding schools and cannot obtain electronic online teaching resources, teachers are required to print the personalized online teaching resources of each learner in the system into a paper version and distribute them to students. After they finish, they will consolidate the collection of evaluation data in the exercise part and update the learner model iteratively.

### 2.4 Establish Online Teaching Resource Database for Innovation and Entrepreneurship

After the design and control of the cycle frequency and presentation mode of personalized online teaching resources are completed, in order to ensure the safety of the storage of massive innovation and entrepreneurship online teaching resources, a teaching resources database is established.

First, build a knowledge map of online teaching resources for innovation and entrepreneurship, connect the dependencies between curriculum knowledge, and plan the path for resource data storage. The construction process of online teaching resource knowledge map is shown in Fig. 2.

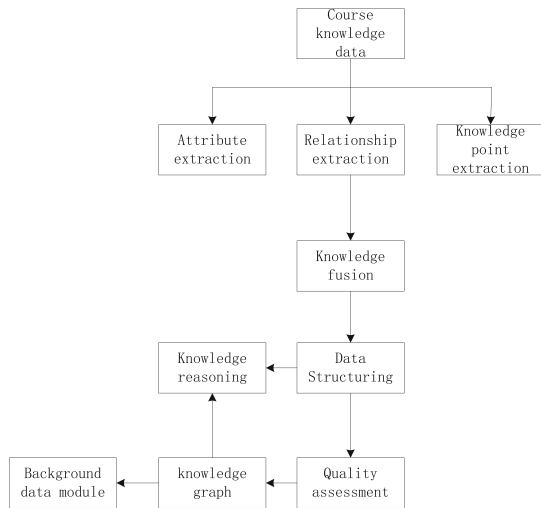


Fig. 2. Construction process of online teaching resource knowledge map

As shown in Fig. 2, Step 1: determine the content outline of online innovation and entrepreneurship teaching courses that need to build a knowledge map. Step 2: analyze the curriculum content outline, complete the extraction of all knowledge points contained in the curriculum content outline, analyze the extracted knowledge points, determine the association relationship between different knowledge points according to the curriculum outline, and form the knowledge point data set and association relationship set. Step 3: Clean and integrate the course content knowledge point data set extracted in step 2 and the association relationship set between different knowledge points to remove errors and redundant data. Step 4: Add the processed knowledge entity to the knowledge entity database, complete the description of the concept hierarchy system, and build a preliminary model of the curriculum knowledge map. Step 5: Design the storage structure [10] for the constructed curriculum knowledge map in the background data module.

On this basis, the database is established. The teaching resource data is mainly uploaded and managed by the system administrator. At the same time, the teacher user can upload and manage the resources through the teacher end application. The resource types are text, picture, sound, and video. The data storage structure of innovation and entrepreneurship online teaching resource database is shown in Table 1.

**Table 1.** Online Teaching Resources Database

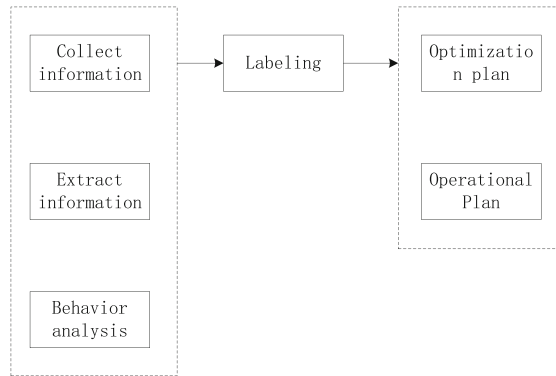
field	explain	type
ZY-ID	Resource id	Int
ZY-MC	Resource name	String
ZY-LX	Resource Type	Int
ZY-YT	Resource use	Int
ZY-TGZ	Resource provider id	Int
ZY-SCSJ	Resource upload time	String
ZY-BCLJ	Resource saving path	String
SSYHFL	User classification	Int
ZY-SM	Resource description	Int
WJGS	file format	Int
FLJB	Classification level	Int
FLQZ	Classification weight	Int
LLKSSJ	Browse Start Time	String
LLJSSJ	Browse End Time	String

Store and manage innovation and entrepreneurship online teaching resources according to the database table shown in Table 1.

## 2.5 Personalized Teaching Resources Push Based on User Characteristics

After the establishment of online teaching resource database based on the above innovation and entrepreneurship, the goal of massive online teaching resource storage has been achieved. On this basis, the user characteristics analysis method is used to make an objective analysis of the specific characteristics of the users of innovative and entrepreneurial online teaching resource push. According to the user characteristics, targeted personalized teaching resource push methods are adopted to achieve the goal of resource oriented push and achieve the best effect of teaching resource push.

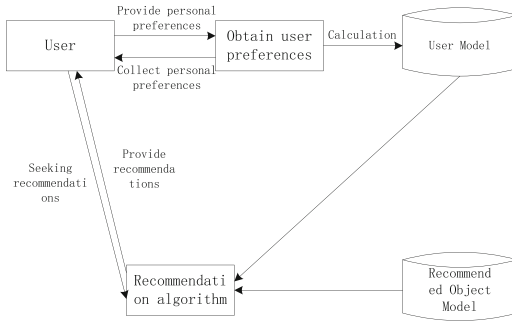
The user feature analysis structure is shown in Fig. 3.



**Fig. 3.** Structure diagram of user characteristics analysis

As shown in Fig. 3, first, collect user related information to extract useful information data. According to the extracted information data, the user behavior characteristics are analyzed based on the operation logic of user feature analysis. According to the analysis results of user behavior characteristics, users are labeled accordingly. The analysis of user characteristics is the key to understand the users' demands. Most of the users' demands and some of the more hidden demands cannot be mined through questionnaires and user interviews, which are relatively superficial methods. By analyzing users' behaviors and characteristics, we can have a deeper understanding of users' demands. When analyzing the characteristics, the method of mapping groups from individuals is adopted. Individual analysis -> key characteristics -> recall verification (technology returns the characteristics to the user database to find the corresponding users) -> solutions.

On this basis, design personalized teaching resources push system. The online teaching resources push system designed in this paper mainly includes three important modules, namely user model, push object model and push algorithm. User model is the key module to obtain user information and determine user needs; The push object model is a content model pushed for users. The push algorithm is a principle algorithm that matches user needs with the pushed content. The general model of innovation and entrepreneurship online teaching resource push system based on user characteristics designed in this paper is shown in Fig. 4.



**Fig. 4.** General Model of Online Teaching Resources Push System

As shown in Fig. 4, the construction of the user model is the basis of the push system. Before building the user module, you need to think about the objects to be modeled and the data to be collected. The general process of user modeling includes six steps: obtaining user information, establishing user model, using the model to push, providing push results, pushing results feedback or demand changes, and updating the user model. There are two ways to obtain user data: explicit input and implicit acquisition. The output content of the user model is mostly the user’s interests or needs. How to model the content of the push object is also a key factor affecting the push system. Before modeling, you need to consider which features of the push object to describe. How to establish the relationship between the feature description of the push object and the user model. Whether the properties of the push object need to be updated automatically, etc. There are two ways to build the push object model, namely, the manager’s own tag and the user generated data. The appropriate way can be selected according to the needs of this study. Push algorithm is the core module of the push system, which mainly includes four push algorithms: content-based push, collaborative filtering based push, association rule based push, knowledge-based push and hybrid push.

First of all, determine the learners’ nearest development zone, locate their learning needs, and push learning resources suitable for their learning level to promote their learning effect, knowledge structure integrity and understanding level. After combining the advantages and disadvantages of several common recommendation algorithms, combined with the characteristics of this study, a hybrid push strategy suitable for this situation is designed, including automatic recommendation of the system and manual recommendation of teachers.

The online teaching resource push method designed in this paper adopts a hybrid recommendation algorithm, including knowledge-based push and association rule based push algorithms. Knowledge based recommendation can be seen as a reasoning technology, which is different from other recommendation algorithms and is not based on user preferences and needs. Functional knowledge is a kind of knowledge about how a project meets a specific user, so it can explain the relationship between needs and push. Therefore, user data can be any knowledge structure that supports reasoning, can be a standardized query by users, or can be a more detailed representation of user needs. The push algorithm based on association rules allows managers to manually set push

rules according to the push requirements to provide users with push content. Teacher recommendation means that when students have reached their learning goals and the system has been unable to automatically associate related resources, teachers need to manually push learning resources according to students' learning conditions.

In order to improve the usability of the recommendation model in online teaching practice and enable students to effectively obtain personalized learning resources, this study designed a personalized learning resource push process based on the analysis of evaluation data, and established a push mechanism and specification for specific push cycle frequency and push presentation mode. The push process in online teaching of push model is shown in Fig. 5.

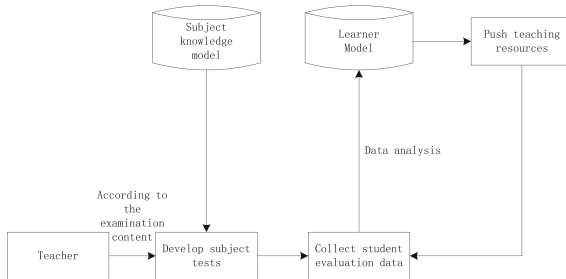


Fig. 5. Schematic diagram of online teaching resources push process

As shown in Fig. 5, first of all, teachers divide the examination content into corresponding knowledge points, call the corresponding questions in the question resource database, and prepare subject tests according to the test preparation requirements proposed by this research; Secondly, the subject test is distributed to students to complete, and the intelligent evaluation data collection system is used to obtain the student evaluation data, and the student evaluation data is analyzed to obtain the knowledge structure and understanding level of learners; Then, a personalized learning resource push model based on evaluation data analysis is adopted to push personalized learning resources for learners; Finally, the evaluation data of students are collected iteratively, analyzed, processed and pushed in a new round. On this basis, the intelligent customized push strategy of teaching resources is designed from two aspects: teacher push and learner push.

Teachers' push strategies are divided into two types: one is resource push for students in the class, and the other is resource push for a student. In the existing education environment, for a certain course, the teaching materials used by teachers are usually unified and customized, and the teaching content and objectives are relatively fixed. The advantage of this kind of teaching materials is that the quality of teaching resources is high, suitable for most learners, and can make teachers stand at a higher level to teach, but also make teachers' teaching less flexible. In actual teaching, students in different classes have different mastery of learning content due to factors such as learning preferences and teachers' teaching methods. However, due to limited classroom time, it is difficult for teachers to have time to provide personalized teaching to students after completing the teaching tasks required by the syllabus. Therefore, the personalized learning resource

push system needs to assist teachers to carry out personalized teaching. Through the use of the system, teachers can provide targeted learning resources to students in their own class according to their learning characteristics, teaching plans and teaching objectives, combined with their own teaching experience, and students can access the resources provided by teachers through the system. The diagram of online teaching resources pushed by teachers is shown in Fig. 6.

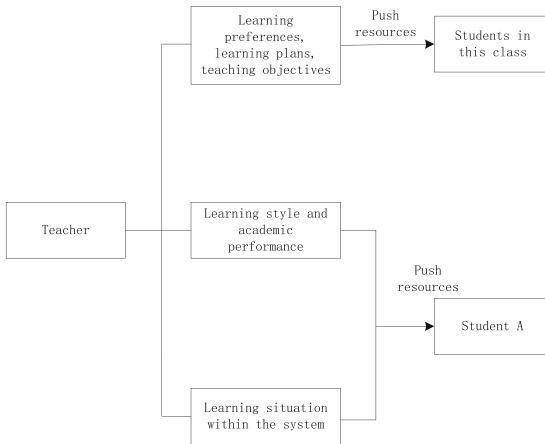


Fig. 6. Schematic diagram of online teaching resources pushed by teachers

As shown in Fig. 6, the resources uploaded by teachers can be the existing learning resources in the system, and teachers can provide them to students through screening; It can also be the learning resources made by teachers themselves. After teachers upload the resources to the server, the system will push the resources uploaded by teachers to the designated class or a student.

The diagram of customized push of online teaching resources by learners is shown in Fig. 7.

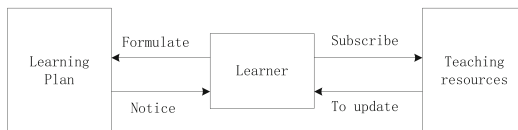


Fig. 7. Schematic diagram of customized push of online teaching resources for learners

As shown in Fig. 7, there are two kinds of customized push for learners: learner subscription and learner plan. Learner subscription refers to that if a learner is interested in a certain type of resource during the learning process, he or she can subscribe to this type of resource. When this type of resource in the system is updated, the system will immediately push it to the learner, and the learner can also cancel the subscription. Then the system will not push this type of resource to the learner. Learner plan means

that learners can make a learning plan for themselves according to their own learning situation. If learners do not complete the corresponding learning plan within the specified time, the system will remind users to learn. If learners complete the learning plan, they will not be reminded. The learning plan can be a learning plan for a certain day or a certain period of time. The customized push of learners can help learners to complete the learning plan.

Through the above process steps, we can achieve the goal of pushing online teaching resources for innovation and entrepreneurship.

### 3 Experimental Analysis

#### 3.1 Experiment Preparation

Experimental testing is an important step in the process of method design. After the development of the proposed online teaching resource push method is completed, we can know whether the method has realized the functional requirements through experimental testing, and run according to the designed workflow. Before the proposed push method is opened to users, through testing, we can find out whether there are functional defects in the operation of the method and abnormal problems in the development process, and repair them in time to provide users with a better experience. This chapter mainly introduces the testing process of the online teaching resource push method designed and implemented in this paper. Firstly, the mobile devices used for testing are introduced, and the methods are tested and analyzed from the aspects of method function and performance. First, build the test environment for this experiment. The innovation and entrepreneurship online teaching resource push method designed and implemented in this paper provides users with mobile applications including teacher end applications and student end applications, teacher end applications for teacher users, and mobile end applications for student users. Since the application end of the system supports the Android operating system and iOS operating system, in order to verify that the application end can operate normally on these two operating systems, this paper selects the Huawei tablet with the Android operating system and the iPhone 13 with the iOS operating system as the test platform. Among them, the software and hardware information of tablet devices equipped with Android operating system is shown in Table 2.

**Table 2.** Android operating system tablet device configuration

number	project	to configure
1	operating system	Android 7.0
2	processor	Snapdragon 425
3	Running memory	3.0GB
4	storage space	32.00GB
5	resolving power	1280 * 800 pixels

Table 3 shows the software and hardware information of iPhone13 of ios operating system.

**Table 3.** Configuration of iOS operating system iPhone13

number	project	to configure
1	operating system	iOS 11.2.6(15D100)
2	processor	AppleA10 + M10 coprocessor
3	Running memory	2.0GB
4	storage space	32.00GB
5	resolving power	1334 * 750 pixels

According to the configuration parameters shown in Table 2 and Table 3, after building the test environment, test the function of the push method to see if the system meets the functional requirements, find the functional deficiencies of the method through the test, and repair the functional deficiencies of the method in a timely manner. The operation method used in the test is to list the expected effect of the teacher end application and personal end application functions respectively, and then test each function of the application according to the user process. If the effect is consistent with the expectation, then the push method meets the functional requirements. Table 4 shows the test results of online teaching resource push methods for innovation and entrepreneurship.

**Table 4.** Test Results of Teaching Resource Push Function

Test content	Expected results	test result
Resource upload	Teacher users can select local resources to upload to the system database	success
resource management	Teacher users can view and use authorized resources on the application end, and can delete uploaded resources	success
Resource push	Teacher users can select resources to push to class students for learning	success
Receive teaching resources	Student users can normally receive the learning resources pushed by the system and the class teachers	success
Complete resource learning	Student users can select resources to complete learning. During the learning process, the system can complete the collection, upload and storage of student user learning behavior data	success
Information prompt during use	The application can correctly use the pop-up frame to complete the information prompt according to the process	success

As shown in Table 4, the resource upload module provides a convenient way for teachers to easily upload local resources to the system database, facilitating the sharing and management of teaching resources with students. The resource management module

enables teachers to easily view, use, and manage authorized resources, while also providing the function of deleting uploaded resources, which is beneficial for teachers to better organize and control teaching resources. The resource push module allows teachers to choose suitable resources to push to class students, providing flexible teaching tools for teachers to effectively convey learning resources to students. The receiving teaching resource module ensures that students can receive the learning resources pushed by the system and teachers normally, providing convenient learning pathways and resource acquisition channels for students. The completion of the resource learning module allows students to choose resources for learning and ensures that the system can collect, upload, and store students' learning behavior data, providing teachers with an understanding and evaluation of students' learning situation. The information prompt module during user use ensures that the application can accurately use pop-up boxes for information prompts according to the process, providing a good user experience and guidance. The functions of the innovation and entrepreneurship online teaching resource push method proposed in this paper based on user characteristics meet the requirements and pass the functional test. The online teaching resource push method not only needs to meet the functional requirements of the design, but also should have efficient execution efficiency, bringing smooth operation experience to users. Next, test the performance of the push method, and then determine the feasibility of the proposed method.

### 3.2 Result Analysis

In order to verify the actual push effect of different online teaching resource push methods, the appropriate course resource package was selected, and the innovation and entrepreneurship online teaching resource push method designed in this paper based on user characteristics was set as the experimental group, the traditional teaching resource push method was set as the control group, and the two online teaching resource push methods were compared. In order to facilitate the acquisition of experimental data, an effective Scrapy grabbing framework is generated using Python. This grabbing framework can effectively extract important teaching resources in the interface and generate resource packages required for experiments. The resource fetching framework is shown in Fig. 8.

It can be seen from Fig. 8 that in the process of running the Scrapy framework, resource scheduling instructions need to be obtained through the crawler first for sorting and classification processing. Next, transfer the intermediate file to the downloader to save the download data. Finally, stop the resource extraction program, generate 10 resource packages, and give them numbers according to the total amount of their internal resources. The larger the number, the higher the total amount of internal resources. In order to improve the experiment efficiency and reduce the experiment time, the multi process technology is used to analyze and allocate data, as shown in Fig. 9.

It can be seen from Fig. 9 that the experimental curriculum data after the above data analysis and distribution process meets the needs of this experiment, and then experimental indicators can be selected. Resource extraction rate of resource package  $P$ . As an experimental index, its calculation formula is:

$$P = \frac{L_R}{F} \times 100\% \quad (5)$$

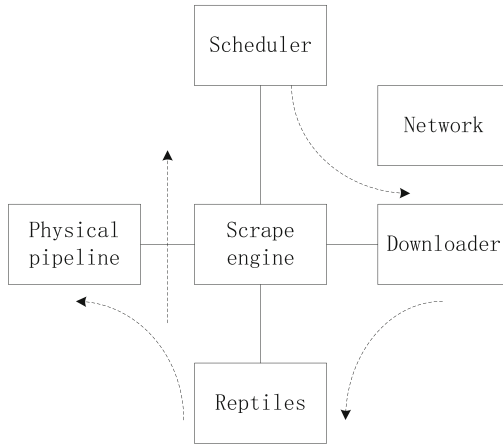


Fig. 8. Resource Grabbing Framework

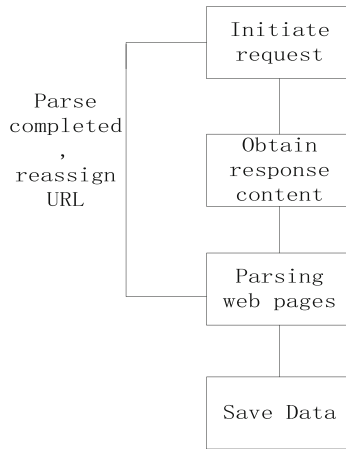


Fig. 9. Flow chart of online teaching resource data analysis and distribution

Among them,  $L_R$  Indicates the amount of online teaching resources targeted for innovation and entrepreneurship;  $F$  It represents the total amount of resources in the online teaching resource package of innovation and entrepreneurship. The higher the resource extraction rate is, the better the actual extraction effect is. On the contrary, the lower the resource extraction rate is, the worse the extraction effect is. In order to minimize the impact of the differences in experimental indicators on the final experimental results, the curriculum data was normalized. The above two online teaching resource push methods were used to carry out experiments, and SPSS statistical analysis software was used to measure and calculate the resource extraction rate of the resource package and make a comparison. The comparison results are shown in Table 5.

**Table 5.** Comparison Results of Resource Extraction Rate of Resource Packages

Resource package	experience group	control group
ZYB01	98.62%	78.47%
ZYB02	97.05%	62.16%
ZYB03	98.13%	80.26%
ZYB04	98.06%	77.61%
ZYB05	98.49%	60.52%
ZYB06	97.65%	78.96%
ZYB07	97.88%	79.46%
ZYB08	98.63%	77.43%
ZYB09	98.47%	76.59%
ZYB10	97.49%	77.26%
ZYB11	99.02%	76.43%
ZYB12	98.57%	81.29%
ZYB13	98.66%	83.49%
ZYB14	97.05%	83.64%
ZYB15	98.63%	80.54%

The comparison results in Table 5 show that the two online teaching resource push methods show different performance effects after application. Among them, after the application of the online teaching resource push method of innovation and entrepreneurship based on user characteristics proposed in this paper, the resource extraction rate of the resource package is always higher than that of the traditional method, reaching more than 97%, while the resource extraction rate of the traditional method is the highest, not more than 83.64%. It is not difficult to see from the comparison results that the push method proposed in this paper has high feasibility, high push effect and certain application value.

## 4 Conclusion

With the reform of educational informatization, online and offline hybrid teaching mode has gradually replaced the traditional teaching mode as the leading teaching mode, and various colleges and universities have used various.

The teaching is carried out on an information-based teaching platform. These teaching platforms are often poorly targeted in the process of pushing teaching resources, and cannot be guaranteed the actual resource extraction rate. Therefore, Research on the push of online teaching resources for innovation and entrepreneurship based on user characteristics. This method first selects an online teaching resource filtering encoder to obtain the characteristics of innovation and entrepreneurship online teaching resources. Secondly, design the frequency and presentation of online teaching resource push cycles,

laying a solid foundation for online teaching resource push. To ensure the security of the storage of massive online teaching resources for innovation and entrepreneurship, a teaching resource database is established. On this basis, the user feature analysis method is used to objectively analyze the specific characteristics of users who push online teaching resources for innovation and entrepreneurship. Based on user characteristics, targeted personalized teaching resource push methods are adopted to achieve the goal of resource targeted push. The experimental results show that the method has higher resource extraction rate, better push effect, and is conducive to improving teaching efficiency, broadening students' knowledge, presenting online teaching resources in a variety of ways. The learning form is more flexible, highly targeted, and has certain application value.

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