

Interactive sharing of fragmented English learning resources based on internet of things

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Abstract: In order to overcome the problems of low user satisfaction in the current research on English learning resources sharing, this paper proposes interactive sharing of fragmented English learning resources based on internet of things technology. This method mainly uses questionnaire survey to investigate students of different grades and majors in normal universities. On the basis of sharing research, this paper introduces the internet of things technology, divides the interactive sharing of English learning resources into perception layer, network layer and application layer, and analyses the key technologies of communication module, resource management module, user management module and dynamic interactive sharing in the process of sharing. The experimental results show that the research results in this paper have good user satisfaction and high resource utilisation rate, and are more suitable for interactive sharing of English learning resources.

Keywords: internet of things; fragmentation; English learning resources; sharing.

Reference to this paper should be made as follows: Zhang, Z., Zhang, X., Chen, K., Wang, N. and Zhang, X. (2022) 'Interactive sharing of fragmented English learning resources based on internet of things', *Int. J. Continuing Engineering Education and Life-Long Learning*, Vol. 32, No. 1, pp.78–93.

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1 Introduction

In the era of rapid development of information technology, the application range of the internet of things technology is becoming wider and wider, and the continuous advancement of network technology has made all industries more aware of the advantages of information technology, which can inject new momentum and vitality into the development of the industry. Promote the continuous progress and development of all walks of life. Under the circumstances, the field of education has gradually realised the important role of internet technology. However, the development of network technology has also gradually fragmented information. Fragmented information can only have a one-sided impact, resulting in the epoch of knowledge and information. Therefore, the integration of information through interactive sharing is a research topic in the network age. Mobile learning terminal is an effective way to integrate fragmented learning resources. Mobile learning is a new learning mode which combines mobile technology and digital learning technology. Nowadays, computers and networks have become an indispensable element in mass learning and work. Fragmented learning resource interaction software is gradually going deep into learning, and integrating scattered learning resources together to form a systematic and complete knowledge information system, which enriches the learning mode and brings convenience to students and teachers (Gu, 2017; Zhang et al., 2017a; Kruk, 2017). With the development of internationalisation, English acquisition has become more and more important, and English learning has become a hot topic. In interactive sharing of fragmented English learning resources based on internet, real-time content interaction and learning resources sharing make that online and offline learning can be closely integrated, and play a great role in the learning and work of students and teachers, known as mobile classroom (Jing et al., 2017; Yang et al., 2012; Lennyn and Satyajayant, 2018). The efficient development of mobile classroom has been welcomed by more and more colleges and universities. However, there are still many problems in the interactive sharing of scattered English learning resources at this stage. For example, there are fewer learning resources, the content is similar, the lack of more valuable knowledge, and the utilisation rate of scattered learning resources is low. Research on such problems is also increasing.

In Li et al. (2017), in order to improve the best effect of English teaching, a cloud space architecture based on TPACK framework, and applied to college English (CE) teaching is proposed. This paper constructs a cloud space model of English learning based on TPACK framework, and designs its structure according to teaching needs and learning cloud space characteristics. The application schemes of learning cloud space in English teaching in this paper is briefly analysed: dynamic allocation scheme of personalised space, self-study scheme based on experience support, fragmentation learning scheme in ubiquitous environment and interactive dialogue scheme in language learning. Finally, cloud space analysis of integrated learning is applied to English teaching and learning, but the resource allocation rate of this method is low. In Li et al. (2019), in order to enhance the allocation of network space resources in CE, a teaching model based on advanced CE network is proposed. It is pointed out that the efficient integration of English teaching resources is very important to improve the quality of teaching and learning. This paper investigates the integration of resources in the network platform of CE teaching, and puts forward the design scheme of strengthening the software and hardware of the network platform, updating the teaching concept of English teachers and cultivating students' self-study consciousness. At the same time, it

extensively consults the relevant experts' opinions and suggestions of English linguistics to integrate English learning and teaching resources efficiently and realise resource sharing. However, this method is not suitable for different stages of English teaching, and users' satisfaction is low. Ma and Qiu (2018) points out that the current English information sharing platform has platform constraints. Under the ubiquitous learning conditions, this paper constructs an English resource data sharing platform based on RSS technology. By giving the overall framework of English language resource sharing platform, the hardware components are studied in detail. According to RSS technology, the speed of pushing and integrating English resources is improved, and the speed of sharing is increased. However, the method in this paper also has the problem of low resource allocation rate.

Sharing learning resources is an effective way to improve students' learning enthusiasm and achievement. The user satisfaction of the above-mentioned results still needs to be optimised. In order to solve the above problems, improve resource utilisation and user satisfaction, this article proposes the interactive sharing of fragmented English learning resources based on the internet of things technology. The interactive sharing of fragmented English learning resources based on internet of things technology is proposed. The specific scheme of this method is as follows:

- 1 Students' demand for teaching resources is analysed through questionnaires, to provide data basis for the construction of interactive resource sharing platform.
- 2 Due to the existence of dominant resources in the information resources of the internet of things, other traditional methods only integrate all information without considering the utilisation of dominant resources. In order to enhance the availability and efficiency of information resources, this paper will code dominant resources to achieve effective integration of resources. By introducing internet of things technology to build a resource sharing platform, and explicit resources are coded to realise effective integration of resources.
- 3 The management of accessing users is realised by classifying users, thus completing the design of interactive sharing platform of fragmented English learning resources based on internet of things technology.

Based on the above principles, in response to the key issues and needs for the interactive sharing of scattered learning resources, sensor technology and the internet are used to apply the internet of things technology to the integration of English resources for the first time. Layer, network layer and application layer three functional modules, through the communication between the terminal and the server, resource organisation, retrieval, downloading, publishing and evaluation, and user grading, etc. to complete the interactive sharing of highly dispersed English learning resources. Experimental results show that the research results of this paper have higher user satisfaction and resource utilisation.

The method of this paper takes into account the bias of user needs, conducts a full investigation of the needs and preferences of the audience, and builds a platform based on its characteristics. It is more targeted, effective knowledge is more concentrated, and resource utilisation is improved. It also makes up for the shortcomings of ignoring the use of advantageous resources in the traditional method, and combines the advantageous resources in the internet of things to build a platform. The shared resources are more

comprehensive and effective. Compared with the traditional methods, the actual application value is more significant.

2 Interactive sharing of fragmented English learning resources based on internet of things

2.1 A survey of demand for fragmented English learning resources

In order to make the sharing of learning resources more practical and better meet the needs of users, we first investigate the needs of students for interactive sharing of fragmented learning resources. Different from the traditional method of covering a large area of knowledge, the method in this article takes the needs of students as the basis for the construction of an interactive sharing platform for fragmented English learning resources. This article uses a questionnaire to conduct demand surveys. When redesigning the questionnaire and survey, certain principles must be followed. In addition to the basic principles that must be related to scattered English learning resources, general principles must be followed, that is, the problem setting must be universal; non-inducible principles, that is, the problem setting cannot induce the respondent to be more favourable to the method in this paper. Direction and so on. At the same time, students of different grades and majors are set to conduct surveys to distinguish gender differences in order to improve the universality and accuracy of the survey. The data obtained were processed using a dichotomy.

The respondents included students of different grades and majors in normal universities. A total of 150 questionnaires are distributed, and the final effective questionnaire is 126. The basic information of the questionnaire is shown in Table 1.

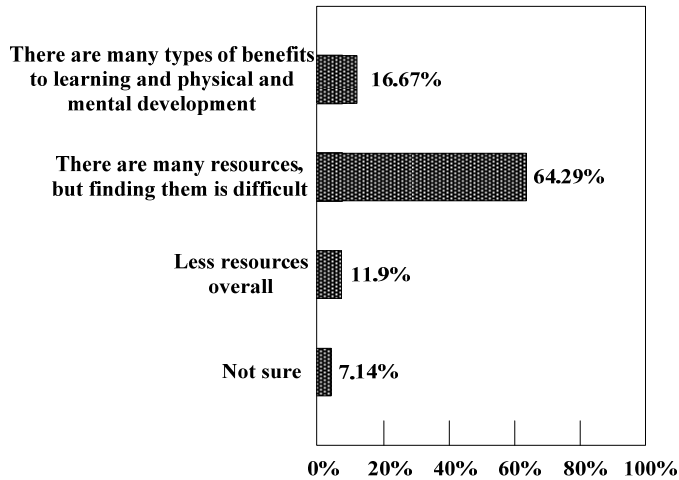
Table 1 Basic situation of questionnaire

<i>Attribute</i>	<i>Category</i>	<i>Number of people</i>
Gender	Male	58
	Female	68
Professional	Institute of class	72
	History class	26
	Arts body type	10
	Other classes	18
Grade	Freshman	20
	Sophomore	19
	Junior	26
	Senior	24
	Graduate	37

According to the questionnaire, the following conclusions are drawn:

2.1.1 Evaluation of available learning resources on current shared platforms

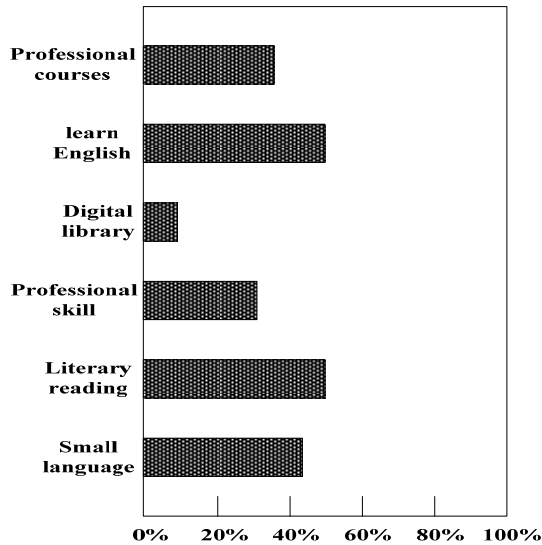
The results of the survey are showed in Figure 1.

Figure 1 Student evaluation of available learning resources on the current shared platform

It can be seen from Figure 1, more than half of the students think that there are a lot of learning resources, but it is difficult to find the resources needed by individuals, which indicates that the management of resources is very important.

2.1.2 Access to learning resources required

The results of the survey are shown in Figure 2, in which there is overlap.

Figure 2 Survey of learning resources required by students

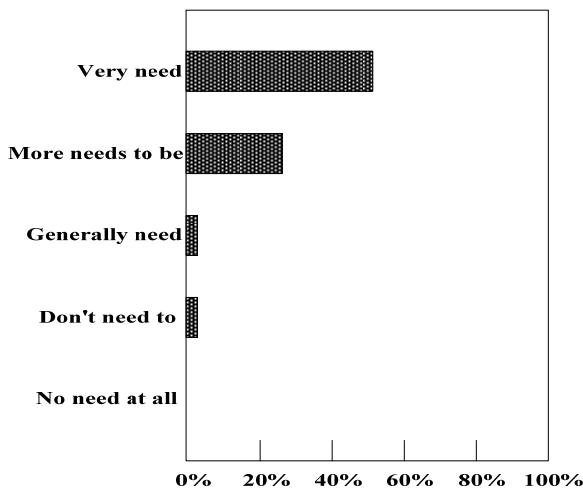
From the figure 2, it can be seen that students have a large demand for learning resources of English and small languages. In addition to the knowledge imparted by teachers in

class, it also needs to be matched with teaching resources sharing platform that can be learned at anytime and anywhere.

2.1.3 Degree of demand for interactive sharing of fragmented learning resources

The results of the survey are shown in Figure 3.

Figure 3 The degree of students' demand for interactive sharing of fragmented learning resources



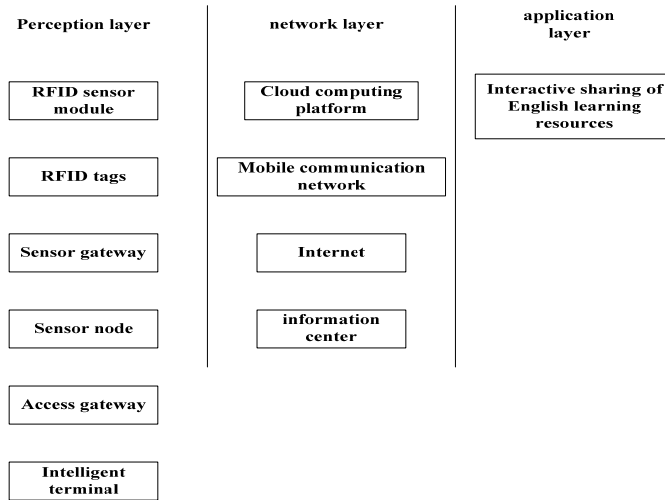
According to Figure 3, students have a high demand for interactive sharing of fragmented learning resources, which also shows that interactive sharing of learning resources is imperative.

According to the above investigation and analysis, the emphasis of interactive sharing of fragmented learning resources is known, and internet of things technology is introduced into interactive sharing of learning resources to meet the needs of students more efficiently.

2.2 Application of internet of things technology

The origin of the definition of the internet of things is the network radio frequency identification technology, or RFID, which can make it possible for people to connect all kinds of goods in their lives and work with the internet (Liu, 2017; Ning et al., 2013; Patrick et al., 2015). The concept of the internet of things can be expressed as a network in which all items communicate with each other through sensor technology and the internet. This article introduces the internet of things technology into the construction of English learning resource sharing platform. First, we need to build the functional modules of the interactive learning and sharing platform for English learning materials. Based on the needs of users, we can realise the interactive sharing of resources through functional modules, which consists of perception layer, network layer and application layer, as shown in Figure 4.

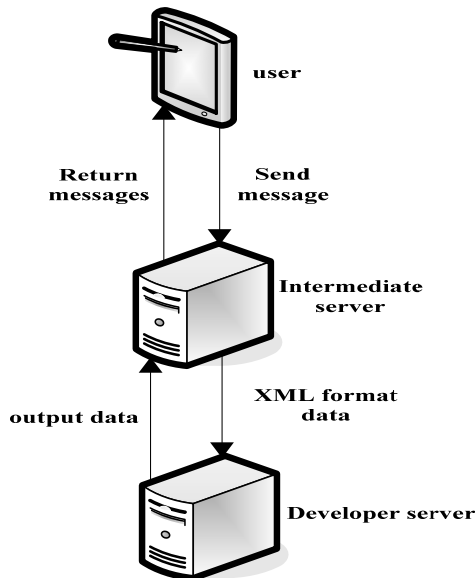
Figure 4 Interactive sharing platform of fragmented English learning resources based on internet of things



2.3 Architecture of the sharing platform of fragmented English learning resource based on internet of things

On the basis of the above-mentioned three overall module architectures, the functions of each module are more detailed, and the platform construction is realised through the refined functions, which improves resource utilisation and user satisfaction. Supported by the internet of things technology, the following key modules of interactive sharing of learning resources are used to realise resource sharing.

Figure 5 Communication mode between terminal and server



2.3.1 Communication module

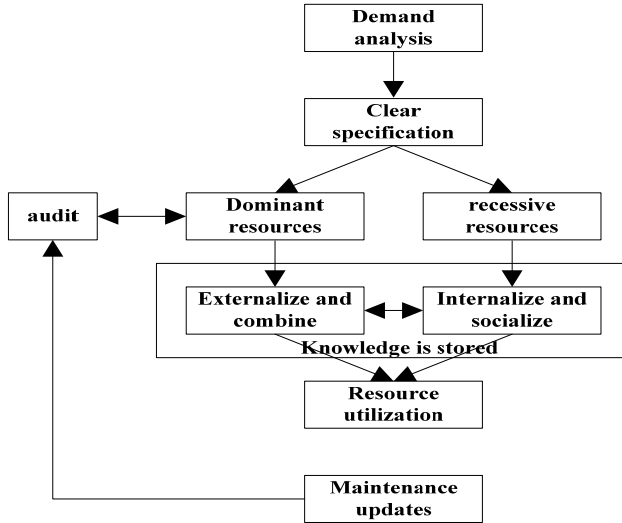
Figure 5 describes the terminal, intermediate server and developer server communication mode of interactive sharing of fragmented English learning resources.

This module describes the communication between the terminal and the developer server to realise the parameter transmission when validating to be a developer. In the future development, the corresponding user should also carry out corresponding communication steps each time.

2.3.2 Resource management module

According to the survey in Subsection 2.1, many students think that there are many learning resources, but it is still difficult to find resources that meet individual needs, which shows that the management of resources is very important. In the resource management module, the explicit and implicit resources of English learning resources are effectively integrated. The structure is shown in Figure 6.

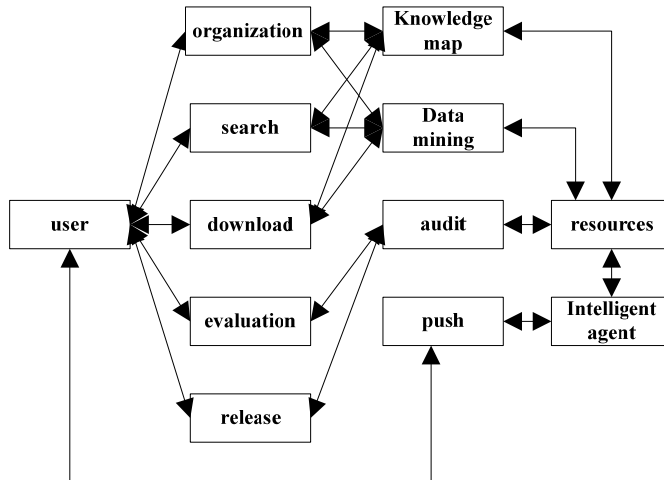
Figure 6 Resource management module



In Subsection 2.1, the value of interactive sharing of English learning resources has been obtained through questionnaires, and the coding norms of explicit resources and the expression of implicit resources have been clarified. In the resource storage module, on the one hand, it promotes the implicit resources and implements the implicit resources storage management by promoting the interaction of interpersonal and social networks; on the other hand, the explicit resources utilisation organises the disorderly fragmentation resources by using the normative approach to form systematic resources, so as to realise the explicit resources storage management; in the audit judgment module, the stored resources are audited firstly, and the resources that meet the requirements are stored; in the resource utilisation module, the explicit and implicit resources are provided to users; in the maintenance and update module, the storage resources are updated in real-time, the static state is converted into dynamic state, and the updated contents are stored after auditing.

The resource management module includes the functions of resource organisation, retrieval, downloading, publishing and evaluation, as shown in Figure 7.

Figure 7 Functional sketch of resource management module



In Figure 7, the organisation, retrieval and downloading of resources need to go through the knowledge map and data mining model to find resources and return them to users. On the shared platform, users' evaluation information and published information need to be audited and verified by the audit unit, and stored if they are qualified. Intelligent agent technology is used to mine users' browsing records and keywords, and push related retrieval resources to users according to push technology to meet users' needs and improve their satisfaction (Liu et al., 2017; Xabier et al., 2017; Chan and Han, 2017).

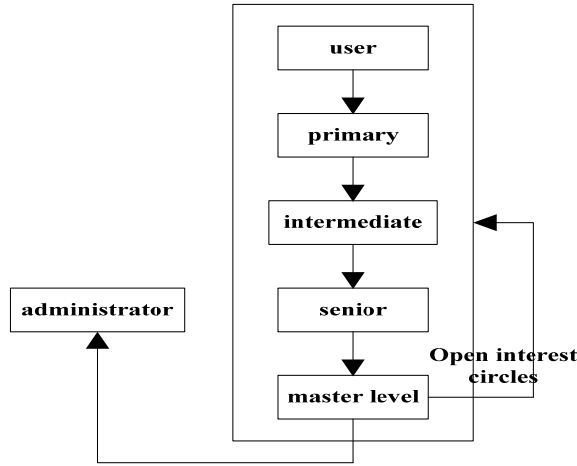
2.3.3 User management module

In the user management module, users are divided into non-registered users and registered users. Among them, non-registered users only have the right to browse resources. Registered users can be divided into grades, which reflects the influence of users on the interactive sharing platform of fragmented English learning resources. Users use registration, participation in discussion and answer operations to get the experience value and integral value (Zhang et al., 2017b; Li, 2017; Yan and Qi, 2017). In the process of users' growing up, more services are provided for users at higher stages, so as to meet the different needs of users at different stages. In this paper, users are divided into four levels, namely, junior, middle, senior and teacher level. If users violate the rules, they will be demoted and their power will be affected accordingly. Figure 8 shows the hierarchical distribution.

In Figure 8, users who log in for the first time will be rewarded with scores, and users can use these points to exchange resources and download them. In addition, it can also search, browse, and add attention to the resources and users that are interested in it. After comments, it can get experience points. When primary users meet promotion criteria, they can become intermediate users. Users of this level not only have various rights of primary users, but also can post, ask and answer questions. On the basis of the continuous

attention of posts, they will get more points. Advanced users can customise the learning resources they are interested in. Teachers can not only have the highest power, but also open interest circles, and invite users with the same interest to join the circle. Users can exchange experience and realise resource sharing. Teacher users also have the right to apply to be administrators of interactive sharing platform of fragmented English learning resources.

Figure 8 User classification in resource sharing

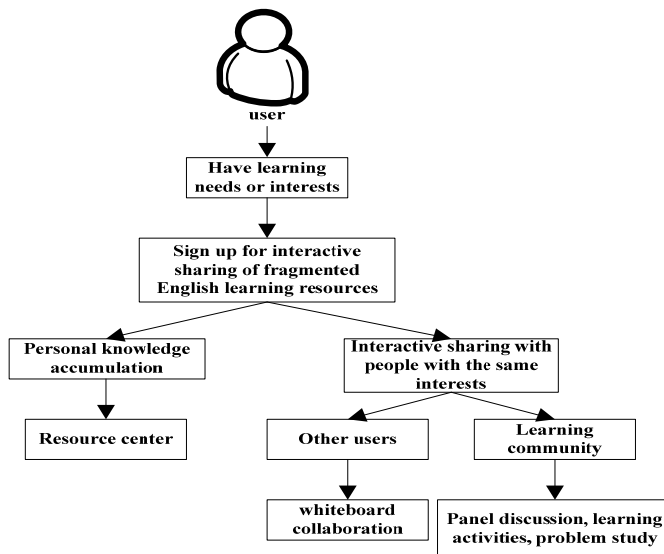


2.3.4 *Dynamic interactive sharing*

Figure 9 shows the dynamic behaviour of users in the interactive sharing of fragmented English learning resources. Users take learning needs or interest as their starting point and join in the interactive sharing of fragmented English learning resources. On the one hand, they accumulate and improve their own knowledge, on the other hand, users with the same interests exchange learning and resource sharing.

In Figure 9, whether we have learning needs or interests is firstly determined, and if so, it can register to participate in the interactive sharing of fragmented English learning resources. After successful registration, while accumulating knowledge continuously, resources are shared interactively with users with the same interests. Among them, resources are shared through whiteboard collaboration with general users, and resources are shared with learning community through thematic discussions, learning activities and problem exploration. Both approaches can effectively improve the utilisation rate of resources in the process of sharing (Priyan and Usha, 2017; Liang et al., 2017; Kishore et al., 2018).

Through the above steps, using the information collection and efficient processing functions of the internet of things technology, an interactive sharing platform of fragmented English learning resources based on the internet of things technology was constructed.

Figure 9 Dynamic interactive sharing of fragmented English learning resources

3 Experiments and discussion

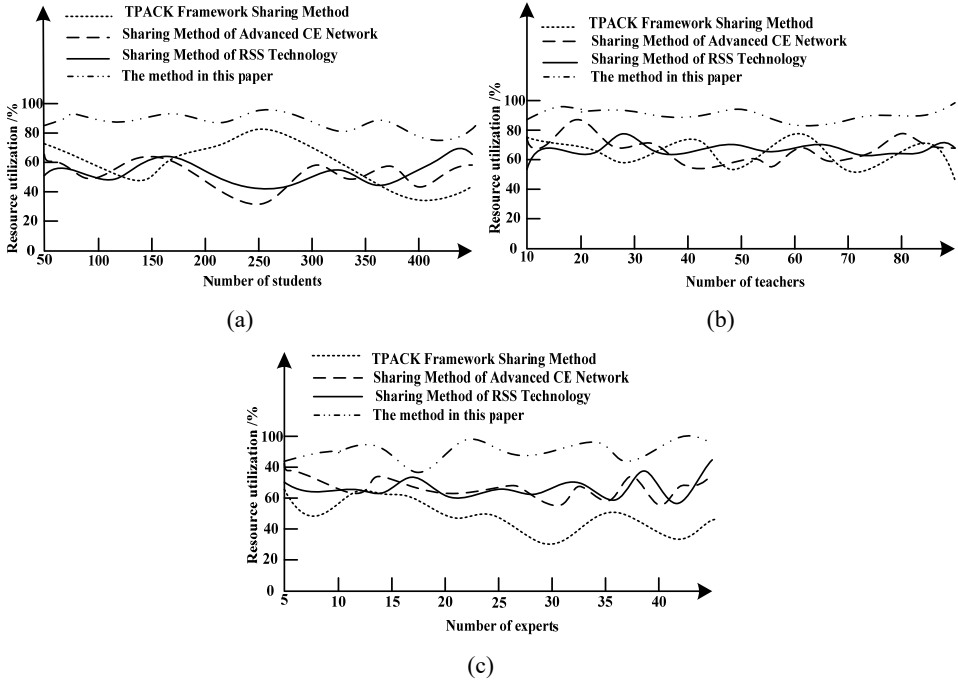
The internet of things technology has penetrated into various industry fields, providing reliable information support for the development of the industry. In the internet of things, there are a large number of sensors with different functions. These sensors provide a lot of information for the internet of things, and due to the sensor function. There are also large differences in the information collected, so these information have a high real-time nature. The internet of things is not simply collecting information, but based on the collected information, processing these accordingly, and intelligently controlling related devices based on the information. Collecting information through sensors and then combining advanced processing technology to complete the integration and sharing of information has an important role in the interactive sharing of scattered English learning resources. Therefore, the method of this article selects the internet of things technology as technical support.

In order to verify the effectiveness of interactive sharing of fragmented English learning resources based on the internet of things technology, tests were performed. The experimental platform is built in a combination of MATLAB and the internet of things. To select 100 college students, teachers, and experts each, and use this method, an RSS-based technical method, an advanced CE network-based method, and a track-frame-based method to design a fragmented English learning resource interactive sharing platform for English learning in a period of time. After that, the computer is used to calculate the utilisation rate of the scattered resources learned on the platform and its satisfaction degree. A random number is selected from 100 people in the three groups of the surveyed, and the resource utilisation rate and satisfaction degree results are counted under different numbers of audiences. In order to analyse the four methods of interactive resource sharing performance. The experimental results are shown below.

3.1 Resource utilisation rate

In order to improve the accuracy and accuracy of the experimental results, multiple groups of different user roles will be setup, and multiple experiments will be performed under different numbers of user role scales to eliminate experimental errors. The resource utilisation results are in Figure 10.

Figure 10 Comparison of resource utilisation of different research results, (a) resource utilisation rate from the perspective of students (b) resource utilisation rate from the perspective of teachers (c) resource utilisation from the perspective of experts



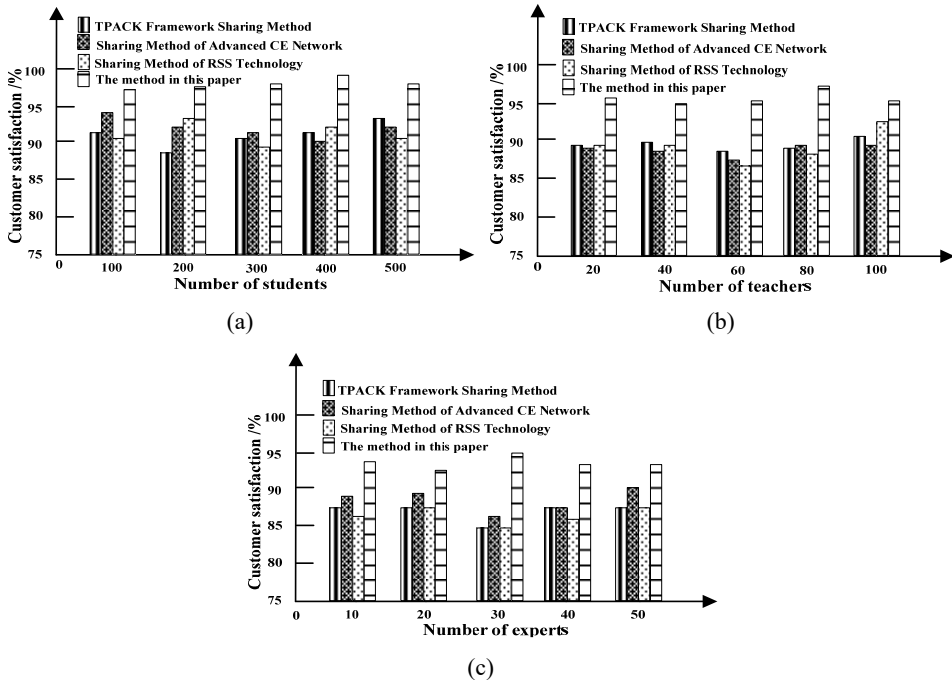
As can be seen from Figure 10, from the perspective of students, teachers, and experts, the utilisation rate of the method in this paper is higher than the method based on RSS technology, the method based on advanced CE network, and the method based on track frame, which can approach 100% at the highest, and the method in this paper. In the perspective of different audiences, the resource utilisation rate has maintained a stable high level, while the other three methods have a large change in resource utilisation rate with the number of audiences, and the resource utilisation rate is very unstable. Because the internet of things technology used in the method in this article will make full use of effective resources, it will confirm the expression of hidden resources by promoting interaction between humans and social networks. Explicit resource organisation organises disorderly fragmented resources through a standardised method, clarifies the coding specifications of explicit resources, forms system resources, and integrates fragmented information. In the process of designing resource interactions, this article shared resources with ordinary users through whiteboard collaboration, and shared resources with the learning community through topic discussions, learning activities and problems.

By adopting a two-pronged model, the resource utilisation rate in the sharing process is effectively improved.

3.2 User satisfaction

The results of user satisfaction are in Figure 11.

Figure 11 Comparison of user satisfaction with different research results, (a) student satisfaction (b) teacher satisfaction (c) expert satisfaction



User satisfaction, as an effective indicator of public acceptance of research results, is very important to verify the effectiveness of resource sharing. It can be seen from Figure 11 that the user satisfaction of the proposed method is the highest under different user role evaluations, and that the user satisfaction varies little with different number of user roles, showing good stability, and based on RSS technology The method, the method based on the advanced CE network, and the method based on the track frame have low user satisfaction and unstable changes. The main reasons are as follows: In order to make the sharing of learning resources more practical and better meet the needs of users, the needs of interactive sharing of scattered learning resources were investigated and analysed through actual surveys. And through the intelligent agent technology to mine the user's browsing history and keywords, according to the user's needs to push the relevant search resources to the user, to meet the needs of users and improve their satisfaction. Through the setting of comments, users can express their own experience and put forward their opinions and suggestions, and use the experience value obtained through comments or interactive exchanges as the key to download more resources. The accumulation of experience value can make users improve themselves Account level, unlock more

permissions, increase user participation and improve user satisfaction. Combining the above aspects can effectively improve user satisfaction.

4 Conclusions

English learning is a part of all-round learning. In view of the importance of fragmented English learning resources sharing and the existing problems of related achievements, this paper proposes the interactive sharing of fragmented English learning resources based on internet of things technology. According to the questionnaire survey, the focus of the research is obtained, the internet of things technology is introduced to build a sharing hierarchy framework, and the key modules in the sharing process are designed and analysed. The experimental results show that the sharing process proposed in this paper can better meet the needs of users and has practicability. In the next step, explicit English learning resources can be divided and managed more carefully, so as to better solve the problem of resources difficult to find.

Acknowledgements

This work was supported by the Educational Reform Project of Hunan Province of China (Grant No. XJT2016202), and the Educational Reform Project of Hunan Institute of Technology (Grant No. JY201438).

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