



Design of Multimodal English Vocabulary Acquisition Mode Based on Cloud Computing Technology

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Abstract. In view of the current mono and inflexible English vocabulary teaching mode, this paper proposes a multi-modal vocabulary acquisition mode based on cloud computing platform. This mode adopts B/S-based multi-layer distributed system design, and computing resources and storage space of cloud computing platform is devised as teaching environment while multi-modality as teaching means. This brand-new vocabulary acquisition mode is able to achieve mobile learning based on cloud computing, cloud sharing of learning resources and other functions, thus making vocabulary acquisition more convenient, efficient and faster. The use of multi-modal teaching methods is capable of activating vocabulary storage of students and improving their vocabulary learning experience, hence their English comprehensive ability is promoted effectively. The test results in this mode show that vocabulary acquisition effect in multi-modal mode based on cloud computing platform is better than that in traditional vocabulary acquisition mode.

Keywords: cloud computing · mobile learning · multimodality · English vocabulary acquisition

1 Introduction

English vocabulary acquisition is the base of English learning. At present, various teaching mode and the application of different online Apps has made vocabulary teaching and consolidation a diversified situation. However, problems such as inflexibility, undue feedback appear in the teaching and learning process. In view of this, this paper proposes a multimodal vocabulary acquisition model based on cloud computing platform. Cloud computing is a user-sharing infrastructure consists of distributed system, grid computing and virtual storage. It can achieve the integration and sharing of hardware through unified management as well as dynamic scheduling of computing resources and storage resources. As an exclusive computing calculation, cloud computing bears the characteristics of high flexibility, high availability, strong security and rich architecture. Nowadays, cloud computing is the choice for most Internet service systems. It is

able to process a large amount of data and achieve functions of traditional computers more efficiently, and support users to obtain application services at any location, at any time with different terminals. With these features, this paper proposes a cloud computing based multimodal English vocabulary acquisition mode to meet students' needs of instant collaborative learning, distributed resource construction sharing, knowledge and experience exchange and reflection, so as to inspire English vocabulary teaching and practical application.

2 Research Method: Construction of Mode

2.1 Design Concept

The new mode proposed in this paper is a multimodal teaching-learning interaction design, which relies on cloud computing hardware devices to arouse vocabulary acquisition. Specifically, the massive virtual computing resources and storage space serve as teaching environment, multimodality as teaching means, with the aim of enabling students to master vocabulary deeply and develop their cognitive ability. Students are users of the system, while teachers are managers who are only responsible for updating and maintaining the data. As the main body of this system, students can conduct self-learning and testing within the system. The major function of this model is to stimulate students' interest and enthusiasm with vivid and interesting content, arouse their senses, keep their attention and train their comprehensive ability. Multimodal theory holds that other nonverbal symbols besides language are the source of meaning just like language. O'Halloran defines multimodal as "the theoretical analysis and practice of integrating language, visual images and other symbolic resources to construct paper, digital media and daily life texts, things and events" [1]. Multimodality does enrich the ways and means of vocabulary teaching, while cloud computing provide recourse, they complement each other. Under cloud computing environment, it is necessary for teachers to stimulate students to acquire knowledge actively and cultivate their abilities with learning environments such as situation, cooperation and conversation, so as to achieve the purpose of effective construction of vocabulary acquisition.

In short, the concept of the new mode can be showed from the chart (Fig. 1).

The vocabulary acquisition context based on cloud computing environment urges students to carry out all-round, open and real social interaction. Such an experimental study of learning is one of the main research contents of the current college English teaching reform, and it is also the product of the integration of information technology and college English curriculum to a deeper level [2].

2.2 Design Structure

Cloud computing is the core of this English vocabulary acquisition model. This system is based on B/S multi-layer distributed architecture design. All operations are completed through web browser without installing software in the terminal, which are more convenient, efficient and faster. Servers are cloud servers function as deploying systems, applications and data. Multi-tier distributed architecture is divided into device layer, data

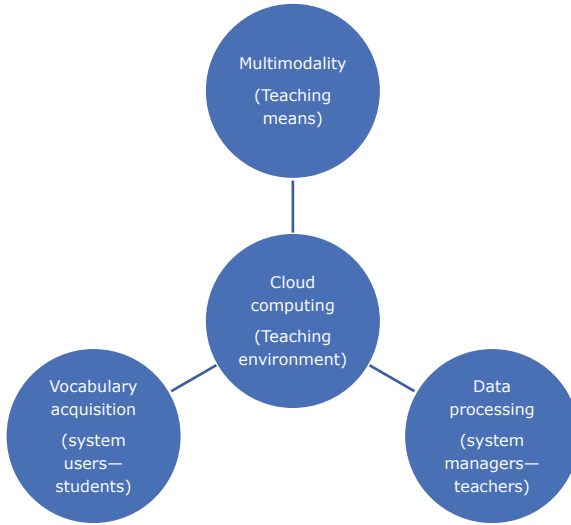


Fig. 1. The Concept of Multimodal Vocabulary Acquisition Based on Cloud Computing

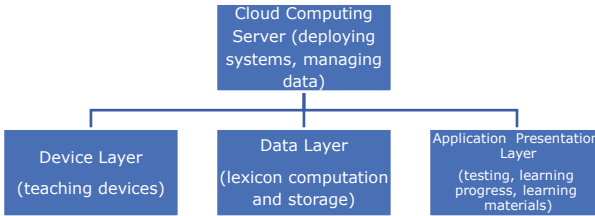


Fig. 2. Design of Cloud Computing Vocabulary Acquisition System

layer and application presentation layer. The device layer mainly includes local physical devices such as PC and other mobile terminals. The data layer is the system database, which is responsible for the calculation and storage of data such as users, word banks and learning progress. A large number of different types of data can be stored in it, and the stored data can be read many times. The stored data are classified through the catalogue, so the names of which are recorded in detail. This is convenient for users to query. Separate storage reduces the interaction between the client, the system and the data throughput of the server [3]. The application presentation layer is a management and application module integrated for the system platform, which includes the functions of retrieving vocabulary data, updating data and establishing a word library, testing, checking learning progress and displaying learning materials (Fig. 2).

2.3 Teaching Mode Design

According to the above structure, this study will construct a multi-modal acquisition mode of cloud computing for vocabulary acquisition. Specific contents are as follows:

Firstly, the device layer: word presentation. With the help of the massive information provided by cloud computing, teachers are able to classify teaching contents into several tasks and store them in vocabulary course. Students are supposed to explore vocabularies by themselves. Through analyzing and understanding words, they could achieve internalization of knowledge, learn to obtain useful information from real language materials and exercise the ability of autonomous learning. In the stage of identifying new words, the following multi-modal teaching are adopted: sound, picture, text, animation, video and other modal forms (determined by characteristics of vocabulary, students and teachers); in the stage of understanding word meaning, multi-modal teaching are: sound, picture, text, animation, video (determined by characteristics of vocabulary, students and teachers); Multi-modal teaching used in the word meaning stage are: sound, picture, text, animation, video and other modal forms (determined by characteristics of vocabulary, students and teachers). Teaching courses in the cloud computing environment can work either online or offline, enabling learners to enter and use them flexibly at any time. In the process of multimodal teaching, learners perceive, understand, encode and store input information, acquired and accumulated receptive knowledge laid the foundation for conscious and automatic output, thus forming a circular system. This cycle helps students to acquire knowledge, improve memory and cognitive ability [4].

Secondly, data layer: words understanding. Cloud computing-based language learning is supposed to adopt various communication methods to enhance students' initiative and creativity. If students are divided into several discussion groups, they are able to exchange learning experiences with teachers and other groups of students, either within or without the discussion groups. Through reading the text explanation of each word, students are supposed to activate prior knowledge; they can guess the meaning of words according to the explanation. Then, the teacher presents each word by multimodal means, displaying the meaning of words completely with text and pictures. In this process, students apply sound representation and visual association of images to infer the meaning of words, while teachers guide students to sum up the same components in this group of words, namely root affixes (such as ego-, -vert). It can be said that the presentation of each word is an organic combination of multimodal and cloud computing.

Thirdly, expression layer: word correlating. Cloud computing database is the storage place of learning and teaching data, and it also bears the function of high-speed vocabulary association [5]. First, teacher traces the source of words (through pictures, words, videos, etc.). For example, ego can be traced back to Freud's concept of personality structure theory. On this basis, teacher guides students to deduce the meanings of egocentric and egomaniac, and allows them to distinguish the meanings of egoist, egocentric, egomaniac by analyzing the word formations, so as to grasp the differences among them in degree. Similarly, they are able to deduce and correlate other words in this unit, and even to classify and summarize the words they have learned, such as words of describing personality. In order to consolidate and grasp the meaning of words deeply, students are required to use vocabulary they have learned to describe the characters they know (including themselves), so that they can master words flexibly as well as grasp connotation and extension meaning fully and deeply (Fig. 3).

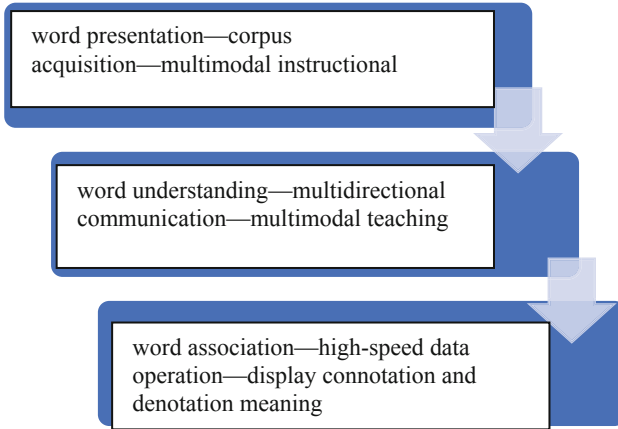


Fig. 3. Multimodal Vocabulary Acquisition Teaching Mode Based on Cloud Computing

3 Testing Design

Teaching feedback is the most direct way to test teaching mode. Therefore, this study adopts repeated test design. Different vocabulary teaching methods are independent variables and vocabulary learning effects are dependent variables. This study compares three vocabulary teaching modes, namely, the combination of cloud computing and multimodal, cloud computing vocabulary acquisition and multimodal vocabulary acquisition. There are four tests in total, including one pre-test, one post-test (instant test), and two delayed tests, one week and two weeks after respectively.

3.1 Comparative Teaching Test

In order to ensure the validity of the research, 3 different classes are selected as the experimental object with three different teaching modes. Multimodal vocabulary teaching based on Cloud computing are used in Class 1. Words teaching under cloud computing environment only is used in class 2. At this context, students learn the target words by themselves from massive information. Class 3 is taught with multimodal vocabulary teaching only. The time span for teachers to present target words is 20 min. After the presentation, teacher gives out test papers. The test is told before class. In order to prevent students from strengthening their memory after class, they are not told that there would be delay tests, and all tests are conducted during normal class hours. The content is vocabulary memory effect, presented by multiple-choice, connection collocation and spelling. There are 20 questions in each test paper, with 1 point for each question, and the test time is 10 min. Because students may reinforce memory according to words order, the presentation order in class is different from that of test questions, and vocabulary sorting of test papers used in all four tests also differ. The following charts are data collected in instant tests and delayed tests.

Table 1 shows that the introduction of cloud computing platform and multimodal teaching method in vocabulary acquisition can greatly improve vocabulary level by

Table 1. Instant Tests: Comparison of Vocabulary Acquisition Between Pre-Test and Post-Test

class	Pre-test average score	Post-test average score	Increase range
1	4.82	16.25	+11.43
2	4.73	12.14	+7.41
3	4.94	13.86	+8.92

Table 2. Delayed Tests: Comparison of Vocabulary Memory Effects of Two Delayed Tests

class	Average delay score (after 1 week)	Average delay score (after 2 weeks)
1	12.73	12.15
2	7.24	6.78
3	8.35	7.86

11.43, 7.41 and 8.92 respectively. However, in cloud computing based multimodal teaching mode, the improvement is higher than the other two teaching modes ($11.43 > 8.92 > 7.41$). In addition, the improvement of vocabulary in multimodal teaching method is slightly higher than that in the input mode of cloud computing (8.92).

According to the statistics in Table 2, in one-week-after delay test, the effect of vocabulary memory in cloud computing based h multi-modality mode is 64% (12.73/20), the teaching mode of cloud computing only is 36%(7.24/20) and the teaching mode of multi-modality only is 42% (8.35/20). It shows that the effect of keeping vocabulary memory is obvious in cloud combining based multimodal teaching mode, but there is no significant difference between the other two teaching modes. The two-week-delay test shows that the retention effect of vocabulary memory in cloud computing based multimodal teaching mode is still significantly better than the other two teaching modes ($12.15 > 7.86 > 6.78$).

3.2 Discussion

From the data of instant test, it can be seen that all three different forms of vocabulary teaching can greatly improve vocabulary memory. The reason for this phenomenon may lie in that all three forms are different from the traditional ways of vocabulary teaching. In traditional vocabulary teaching, teachers often play the role of dictionary disseminators. This kind of spoon-feeding teaching will make students feel bored and tired of vocabulary acquisition. However, these three teaching forms are novel and unique, they are able to open up students' thinking and stimulate their curiosity. Compared with the three teaching modes, the improvement of vocabulary memory effect as well as memory retention effect in cloud computing based multimodal mode is higher than that in the other two teaching modes. The results of two delay tests continue this trend. We can

explain it from the perspective of information integration. In this new mode, a variety of information can stimulate learners' brains, and information such as language, vision, hearing and image can be referenced and correlated. The integrated information is richer and more efficient. Compared with the stimulation alone, this information will be stored in memory after coding, and the memory will be deeper and the memory traces will be more lasting [6].

4 Research Findings

To sum up, cloud computing based multimodal English vocabulary acquisition mode proposed in this paper, enables students to achieve English vocabulary in a flexible context. It provides access for students' English vocabulary test and establishes a dedicated dictionary through mobile terminals. Teachers are able to manage learning resources, user information and word library through the cloud server. The new teaching mode does realize mobile learning, cloud sharing of learning resources and other functions, thus enhance students' learning experience and promote students' vocabulary learning effectively. This mode has high requirements for both hardware and software, such as modern teaching equipment, teachers' mastery of modern educational technology and etymology. Cloud computing platform just meets the requirements. Both cloud computing and multimodal vocabulary teaching alone have their own advantages and disadvantages, and the combined vocabulary teaching mode can effectively make up for the disadvantages of the two forms. Although it complements each other with the combination of computation and multimodal, it still needs to deal with redundant or repeated information input. These are all areas that need to be improved in related research in the future.

5 Conclusion

The multi-modal vocabulary teaching mode based on cloud computing proposed in this paper is a multi-modal interactive mode of teaching and learning. It depends on cloud computing hardware devices to arouse vocabulary acquisition. This model puts emphasis on stimulating students' interest, enthusiasm, senses, keeping their attention as well as training their comprehensive ability. Multi-modality enriches the ways and means of vocabulary teaching, while cognitive strategies provide theoretical guidelines, and they complement each other. Last but not the least, cloud computing mode is able to meet students' needs for instant collaborative learning, distributing resource construction and sharing, exchanging knowledge, experience and reflection, etc., thus, the combination of them does inspire English vocabulary teaching and practical application. The result of delayed comparative teaching test proves the feasibility and effectiveness of this mode. Although there is still some room for improvement, it is still an effective attempt to apply cloud computing in traditional English vocabulary acquisition.

References

1. O'Halloran, K. L. (2008) Inter-Semiotic Expansion of Experiential Meaning: Hierarchical Scales and Metaphor in Mathematics Discourse.//Carys Jones & Eija Ventola. *From Language to Multimodality: New Developments in the Study of Ideational Meaning*. London: Equinox, p. 231.
2. Wu Yun (2009). Analysis and Design of the Basic Framework of College English Network Teaching Platform. Hefei: Master's Thesis of University of Science and Technology of China, p. 29.
3. Zeng Desheng, Luo Jinwei, Liu Beixiong (2018). Research on mass measurement data retrieval technology in cloud computing environment. *Electronic design engineering*, 26(22), pp. 72-76.
4. Zeng Qingmin (2011). A study on the effectiveness of multi-modal audio-visual teaching model on the development of listening and speaking ability. *Journal of PLA Foreign Languages Institute*, (6), p. 72.
5. Hu Ling, Kou Yuanyuan (2018). Design and application of English practice system based on cloud computing network platform. *Application of Microcomputer*, 34 (5), pp. 63-65.
6. Cui Min, Zhou Chunfang (2015). Research on the effect of multimedia presentation in foreign language vocabulary direct learning. *Journal of PLA Foreign Languages Institute*, (3), p. 93.

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