The Development of the Mobile Situated Learning Application based on Microlocation Technology

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***Abstract*—According to the statistics of the Bureau of Tourism, the number of tourist to Taiwan has reached as high as 75 million in recent ten years, the whole world show the trend of internationalization gradually. In this situation, English has been becoming the necessary language, also it becomes the second language of the global people. Learning English is regarded as a national activity nowadays. However, most of us can't learn it well because we grow in a Chinese environment, and there is no suitable environment for us to learn English. Therefore, the scholar suggested using Situated Learning Theory (SLT) to obtain a real learning effect. In the real life, context-aware interact with other individuals to achieve the effect of situated learning. In this study, we uses iBeacon microlocation technology to let the users learning English in the real environment, and to gather information from the environment. The users can learn efficiently in the real environment by situated language teaching. Users can not only get the knowledge after learning, but also achieve the benefits from learning.**

Keywords—Situated Learning Theory (SLT), Context-aware, iBeacon

I. INTRODUCTION

In recent years, English has become an international standard language. It is a universal activity for people to learn English and 80% Taiwanese have learned English for years from kindergarten till now. However, it is a pity that most of them fail to fully express themselves in English and think that they have not learnt English well, often saying, "My English is very poor". Is it true that they have not learnt English well? With a long time of English learning, most people have mastered the elementary English knowledge and they are just not good at expressing themselves in English. Even if people averagely spend 3.5 hours learning English every day, they still live in the Chinese environment where there is no suitable situation for English learning. In this case, it is certainly not easy to learn English well. Therefore, some scholar advocates applying the theory of learning situation to acquire the real learning effectiveness; for instance, Brown et al. proposed that learning is an acculturation process and the meaning and value of learning can be embodied only when you learn in real community of practice. The school course is criticized by the aforesaid concept because it focuses too much attention to the learning of textbook knowledge and there is no learning experience in community of practice involved [1].

It's not that easy to construct English learning situation. In view of the current surrounding environment, real language learning situation and poor expressivity, this research attempts to use the iBeacon's micro-positioning function to set the location in museum, restaurant, store, etc. When your mobile phone detects the information of iBeacon's location situation, you can learn by interacting with users' surrounding environment. The English obtained from the vocabulary performance includes the single words and expressions commonly used in daily life. With the listing narration and use of straightforward sentence structure and grammar, users can learn English conveniently and rapidly and apply it flexibly to real situations. In this way, users can learn English whenever and wherever possible to enhance English ability, achieve better effects with half efforts and gain language learning fun in the proposed mobile application.

II. LITERATURE REVIEW

A. Context-aware Services

In [8], context-aware is a kind of cross-platform network service which can automatically perceive users' required information and further become aware of users' demand according to different surrounding environmental features including users' environmental awareness or environmental factor in itself. Thus, appropriate information and service can be offered and further transmitted in a timely way for user's application.

The application of context-aware technology and information and the operation of software can further generate context-aware computing. Context-aware computing can strengthen the ability of context awareness to capture and reprocess surrounding data and extend more smart applications. For instance, automatically capture the wave length of voice for calculation and analysis to further understand the distance of voice source and master users' location [2][8].

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B. Situated Learning Theory (SLT)

SLT is designed by English applied linguists Palmer and Hornby who ever proposed that "situation" is an important factor in the course of language learning. In their opinions, "situation requires language and language should be taught on the basis of situation". Any language knowledge and application occur in the activity situation, which can improve learner's learning interest and effect. It is necessary to integrate learning into actual social culture and life to perceive, understand and apply what you have learned. In this way, learners can be personally on the scene, changing from image perception to abstract rational thinking and insight. Through active interaction and learning process with everything around learners, they can gain the social and true knowledge so as to apply what they have learned to the actual life environment [3][4].

C. iBeacon

iBeacon is the positioning and communication device issued by Apple Inc. and it is also a super-miniature computer equipped with micro-processor and memory. For its Bluetooth Low Energy (BLE), iBeacon APP or operation system can sense and transmit the unique identifier (UUID) which can track down and determine physical location of equipment on the network. Bluetooth 4.0 is proposed according to the Bluetooth technology standard set by SIG to achieve two-way transmission in technology. Compared with traditional Bluetooth, Bluetooth 4.0 has the advantages of lower cost and lower energy. One button cell can make the Bluetooth Low Energy be operated for 1 to 2 years [5][6].

Prior to Apple Store, American MLB has been equipped with iBeacon. Its APP can provide navigation system, so the ticket in your hand will pop out automatically and your position will be indicated when you get close to ticket entrance. When iBeacon is connected to the nearest iBeacon base station, the position information of base station will be gained and customers will be provided with high-quality service. For iBeacon, the maximum receiving range is up to 50m which is exceeding the distance of NFC range. Combine with 3 devices of iBeacon can form the triangular indoor positioning system, the indoor positioning desired by Google can be done easily. iBeacon has unique identifier (UUID) to realize the function of information exchange [7]. When the special UUID is transmitted, APP can make use of the device location known by UUID to provide service.

With the combination of iBeacon and context-aware service, the direct interaction with other individuals can be completed in the real situation through context-aware technology; meanwhile, the data in the surrounding environment can be captured according to users' current location. Moreover, SLT is combined so that users can integrate themselves into the actual environment rapidly for learning. Thus, they can both gain the knowledge contents after learning and achieve the learning effect.

III. SYATEM DESIGN AND DEVELOPMENT

A. Design of the System

In this research, the systematic environment of iBeacon English learning APP is designed into 3 modules (single word module, sentence pattern module and other modules) and 9 learning models (part of speech, example sentence, KK phonetic symbol, synonym, useful expression, grammar and phrase, related word, extended word and tense). The APP in this research can make users achieve easy learning and convenient operation and the APP's requirement and function are described as below.

(1) Desktop Reminder

Desktop Reminder is one of the features of iBeacon English learning APP. When mobile phone detects iBeacon English learning device, there will be a small label on the desktop reminding users of situated learning. It is a little like Line APP, namely if the information is being transmitted, a small rectangle message box will appear on the screen. Even if the phone is executing other programs or APPs, the reminder can also be received. Thus, with such considerate service function, any learning opportunity will not be missed.

(2) Simulation Map

iBeacon's micro-positioning function can be used to present the Simulation Map of the current environment according to users' location and distinguish learning block to facilitate users' understanding of the current learning situation.

(3) Situated Learning

The interactive learning is conducted according to users' current surrounding environment. The English gained from vocabulary performance includes the single words and expressions commonly used in daily life.

(4) Learning Variety

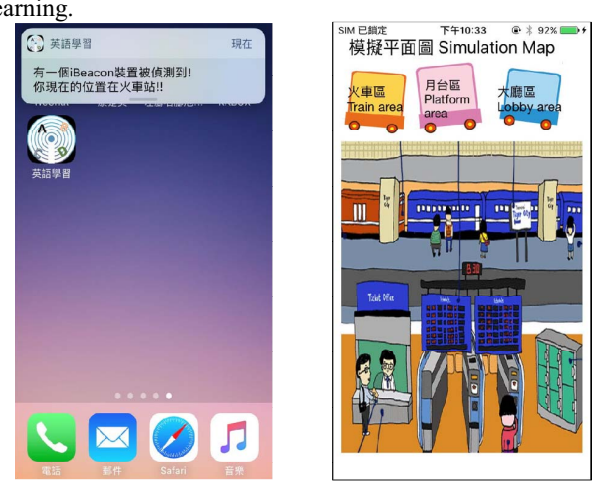
Three modules (single word module, sentence pattern module and other modules) and 9 learning models (part of speech, example sentence, KK phonetic symbol, synonym, useful expression, grammar/phrase, related word, extended word and tense) are provided. A small voice speaker is equipped for all the models except the models of part of speech and grammar/phrase. The function of offline pronunciation is used to improve English listening and speaking ability.

(5) Memo

The button label of Add Memo is designed on the top right corner in the learning models, so as to record the learned vocabularies, sentence patterns, etc. to facilitate the subsequent repeated review.

B. *System Implementation*

When users intend to learn English with iBeacon, they must download iBeacon English learning APP firstly, and then open positioning system and Bluetooth device. When users enter the space equipped with iBeacon English learning, a small label is used on the phone desktop to tell users that they are now in the position where iBeacon English learning can be conducted (shown in Figure 1 (a)). As shown in Figure 1 (b), when iBeacon English learning APP is opened, the Simulation Map of this space will firstly appear on the screen, and users can choose the desired learning space on their own for learning.



(a) (b)

Figure 1. iBeacon English learning APP Interface

In Figure 2, each learning block covers 3 modules and 9 learning models. Users can learn depending on their own demands. A small voice speaker is equipped for all the learning models except the models of part of speech and grammar/phrase. Users can use a small voice speaker to know how to pronounce this single word and they can also play the voice speaker repeatedly in the section of sentence to enhance their own English listening and speaking ability. However, all the single words and grammars are not remembered completely after their learning. In order to achieve the aim that users can review the learning contents repeatedly, the function of Memo is added in the APP, and it is like an electronic textbook where users can record the contents which are easy to be forgotten or difficult parts at any time. When users want to review this single word, sentence pattern, etc., it is unnecessary to go back to the location set by iBeacon. Thus, they can learn at home with ease.

Figure 2. English learning modules

IV. RESEARCH METHOD

This research adopted iBeacon's micro-positioning function to make users learn English in real environment. We proposed three learning modules to achieve situated learning process. The descriptions of those modules are shown as follows.

A. *System Modules*

(1) Module of single word

The learning of part of speech, example sentence, KK phonetic symbol and synonym refers to the single word in the context. Choose the single word to be learned, the system will display its different meanings in different part of speeches, and the example sentence will be attached to clearly explain the usage in different part of speeches. A correct pronunciation method can be taught through a small voice speaker of KK phonetic symbol and the synonym lists other alternative single words. All the models are equipped with a small voice speaker except the models of part of speech to deepen the impression of single word via listening.

(2) Module of sentence pattern

The learning of expression and grammar/phrase refers to the sentence easily applied in the context. Useful expression learning mainly includes the dialogues and sentences commonly used in daily life and a small voice speaker is equipped for the listening and speaking practice. If grammars appear in the sentences of useful expression learning, grammar formula will be listed in the grammar learning to detail the correct usage and situation; phrase refers to the usage possibly applied in this situation.

(3) Other modules

The learning of related word, extended word and tense refers to the single word and verb tense extended in the module of single word for the purpose of in-depth learning.

The purpose of learning related words is to add other single words or prepositions to gain another meaning. The purpose of learning extended word is to learn another single word which is very similar to this single word and easy to be mistaken. In terms of learning of tense, if one single word is changed to a verb for use, list 3 tenses: present tense, past tense and past participle. The intonation of the single words in the above-mentioned 3 types of learning is very similar and they may be confused, so a small voice speaker is equipped for users so as to distinguish the similar single words by repeated listening.

B. System Operation Framework

The framework of system operation for this research is shown in the Figure 2. The whole system framework of iBeacon English learning APP is composed of 7 elements: iBeacon micro-positioning technology, Bluetooth device, voice learning, storage element, 3 modules, 9 learning models and mobile device. The APP mainly provides Simulation Map of the space detected by iBeacon to facilitate users' understanding of context-aware learning of the current location. iBeacon English learning APP includes the English context expressions commonly seen in daily life and they are displayed on users' mobile device for the convenience of their learning. Finally, the function of memo is provided to record the single word and sentence patterns conveniently which are easy to be forgotten and it can also be used for repeated practice.

C. Discussions

This research applies the special positioning advantages of iBeacon. iBeacon provides the micro-positioning service so that the proposed system can sense the position of the learners. In spite of no WIFI, it can still provide users with English learning which conforms to the situation according to the space they belong to. On one hand, users can rapidly learn English grammar related to situation; on the other hand, users can also try to communicate with others in English or they can easily use iBeacon English learning APP for temporary situated English learning in case of emergency situation.

In order to apply evaluation experiment in the future, we invited several experts to explore the proposed English learning APP and evaluate the effectiveness of it by providing comments according to system features. There are total 10 experts in this reviewing process. Among these 10 experts, we invited 6 experts who teach in Information Management Department and they provided their comments according to technology perspectives. Besides, we invited 4 experts who teach in Applied English Department and they provides their comments according to English learning assistant tool perspectives.

Generally speaking, those experts provided positive comments to the proposed English learning APP. Accordingly, there are some suggestions from the teachers in Applied English Department. Firstly, they suggested the APP can provide other learning functions, for example, online English quiz. They believed more functions can help learners to stay in the APP and use the APP frequently. The other suggestion, although the pop-up suggesting vocabulary matches the learner environment, however, the example sentences should also provide situated learning content. They suggested to revise the learning example sentences to fit the situated learning concept and bring more connection between the sentences and the environment.

V. CONCLUSIONS

English learning is a trend in this globalization world. Mobile learning APPs designed for English learning are also gradually growing nowadays. Besides, iBeacon is a new technology for supporting microlocation need. Therefore, this study developed a microlocation-based English learning APP and proposed the learning model to fit the Situated Learning Theory. With the combination of the proposed APP, English learning materials and iBeacon microlocation feature, learners can receive the surrounding related learning materials. In this manner, learners will have chance to build the connection between the learning materials and the environment which can enforce their memory to remember the learning concept.

In the reviewing process with the experts, they suggested that with the minor revision to the APP, the APP can raise the learning intent of the learners and may improve their learning effectiveness. Therefore, we will also conduct the learning experiment in the future to evaluate the effectiveness of the APP. Accordingly, we will evaluate the proposed learning APP and the learning model by observing the learners' learning outcome and feedback to elaborate the contribution of this study.

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