The Development of Context-Aware Ubiquitous English Learning System

Jin Tan Yang, Dept. of Teaching Chinese as Second Language at Ming Chuan University, Taiwan
Yen-Ming Huang, Dept. of Engineering Science National Cheng Kung University, Taiwan
Ching-Jung Liao, Dept. of Information Management, Chung Yuan Christian University, Taiwan

Email: yangdav@mcu.edu.tw  http://icrd.mcu.edu.tw
Address: 250 Zhong Shan N. Rd., Sec. 5, Taipei 111, Taiwan

Abstract: The purpose of this study is to create an environment for a situated English learning environment. While situated learning is easy sense-making in bilingual language learning, ubiquitous learning environment should be given as first step. The technologies adopted in this study are based on wireless and RDFID to implement a Ubiquitous English Learning System (UELS). Through the UELS environment, learners can learn English in a context-aware environment. The results of this study show 2 learning scenario in medical rescue and restaurant via movie dialogue. The implications of this study are also included.

Key-Words: Ubiquitous Learning, Situated Learning, Context-Aware, Language Learning

1 The motivation of this study

Learning a second language consists of phonology, morphology, lexicology, syntax) and semantics [1]. If those factors are taken into account in learning a second language, learning second language will be an abstract discipline for learners [2]. From the semantics formation and presentation process, learners must have many important background knowledge such as semantic understanding and presentation skills in terms of learners’ mental status on social, time, space, and inter-relationships in real situated environment. To let learners to comprehend all factors together is beyond traditional textbook capabilities to provide [3]. Those dynamic factors can be accumulated by multimedia data-bank except the learning background knowledge embedded in learners’ mind [4]. Due to technological development on multimedia in networking, ubiquitous learning environment is possible to be implemented for learners.

Thank to wireless technological development, learning environment and the way of learning have been dramatically changed during the last decade, ubiquitous learning environment offers another option for learning beyond traditional classroom provided by lecture-oriented instruction. After promoting e-Taiwan, M-Taiwan by Taiwan government in 1990s, U(Ubiquitous)-Taiwan is an emerging issue in Taiwan education in 21st century. In a national project, the new technologies consist of RFID (Radio Frequency IDentification) and wireless network with broadband. It integrates digital family, internet, and wireless facilities to provide ubiquitous learning. Taiwan government does hope that the ubiquitous learning can make Taiwan in the map like the first Taiwan miracle in PC manufacture since 1980s. The U-Taiwan project mainly applies RFID technology to show the ubiquitous learning in real context.

Fortunately, context-aware is mature enough recently [5] and can be design to fulfill ubiquitous learning environment while many communities have facilities to support learners to communicate more intensively. Therefore, how to analyze and develop an environment to support ubiquitous learning is a highly challenges task in Taiwan because it covers software design to meet teaching and learning based on current hardware capability. In this study, we focus on development an English Learning because Taiwan government like another Asia countries have put immeasurable efforts in English Learning with low achievement [6]. Based on the above statements, this study develops an English Learning environment for freshmen at National Cheng-Kung University and Ming Chuan University in Taiwan. Two factors are English scenario courseware design and its development of the ubiquitous learning environment.

2 Literature Review

In this section, situated language learning and ubiquitous learning will be reviewed.

2.1 Situational Language Learning

The Oral Approach or Situational Language Learning teaching methodologies, proposed by Palmer & Hornby [7], have been greatly influenced by developments in the theory of language. In Palmer
& Hornby assertion, three processes in learning a language consist of receiving the knowledge or materials, fixing it in the memory by repetition, and using it in actual practice until it becomes a personal skill.

In daily life, language learning offers real context by cases and dialogues and makes learners comfortable while it gives concrete image or tangible objects in learning environment. In a nutshell, learning English should be linked to daily life instead of symbol manipulation in the lecture-oriented classroom [8]. In the situated learning environment, learners play as active learners in real context. The knowledge is like a tool to be used by learners. Many rules in knowledge construction depend on practical experiences to understand. The real understanding comes from interaction between learner and learning environment.

2.2 Ubiquitous Learning

Recently, the development of wireless and cell phone technologies with sensor, communication, and computation is dramatically changed to small size and low-cost like a micro computer in 1980s compared to IBM mainframe computer [9]. Ubiquitous computing integrates all micro devices in daily living space for collecting environment information such as location, near restaurant. That information can be processed to active support individuals based upon his/her needs. Those context-aware devices are essential part in a ubiquitous learning environment.

Ogata & Yano [10] propose a comparison of learning model in terms of mobility and embeddedness level in Figure 1. The ubiquitous learning locates the first quarter although the level of mobility is as high as mobile learning and the level of embeddedness is as high as pervasive learning. In ubiquitous learning, learners are free from wearable devices, so it owns higher mobility than that of pervasive learning.

Relating to ubiquitous learning research, many successful studies have been explored [11]. Those studies are mainly outdoor-learning activities or museum browsing. Their research results reveal that ubiquitous learning provides learning content at right time and right place. Furthermore, five factors, including “Right Time”, “Right Space”, “Right Method”, “Right Thing”, and “Right Role”, have been identified for learners who can learn better in terms of ubiquitous learning.

3 Research Methodology

The 6 modules in Fig. 2 consist of management, public functionality, teachers’ functionality, digital course, learners’ functionality, and anonymous user modules.

<table>
<thead>
<tr>
<th>UELS</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management modules</td>
<td>Account management, BBS, and announcement area</td>
</tr>
<tr>
<td>Anonymous user modules</td>
<td>Recent news, login/registration, password query, and course information</td>
</tr>
<tr>
<td>Public utility</td>
<td>Personalized information, email, and Blog</td>
</tr>
<tr>
<td>Teacher utility</td>
<td>Announcement, course &amp; assignment management</td>
</tr>
<tr>
<td>Digital course</td>
<td>Course browsing, course discussion, quiz, learning status quo</td>
</tr>
<tr>
<td>Learner utility</td>
<td>Learning portfolio, instant interaction, course listing, assignment</td>
</tr>
</tbody>
</table>

Fig. 2: the listing of six modules in ULES

Furthermore, learners can set their preferences like iGoogle website as personalization portal. Once learners set their preferences, the portal can be used to guide learners to move to what they intend to go.

3.1 Learning platform with intelligent social network

The purpose of ULES is to offer student/teacher for learning and teaching in context-aware environment. The framework of ULES is shown in Fig. 3.
Ubiquitous English Learning System (UELS) means that learners can attain context-aware content no matter wherever or whenever they are learning English. In other words, learners can inquire the movie databank for real learning context.

In the client side, learners hold hand-held device such as PDA with RFID. While RFID Reader gets neighborhood RFID Tag, the server can identify learner location and GPS will attain the latitude and longitude of learners. Those context information will be compared in context-aware databank and get the results for Learning Management System. The LMS will launch the appropriate content to learners.

In Fig 4, a learner owns “personal tool” such as email or notebook, “information platform” such as current news or e-Learning, “system functionality” such as learner profile, “student area” such as my-course summary, and “Blog recommendation” such as teacher’s or student’s Blog.

To meet context awareness in this study, the website is designed for detecting different carriers or device information such as:

- Screen size of learning device.
- Bandwidth of learning device.
- Multimedia processing capability of learning device.
- Memory capacity of learning device.

The mechanism for learner device is embedded for calculation. Next step is to forward those results to “Content Transform Module” for adapting learners’ device. All learners device have been categorized into 6 levels to present course content in different devices and shown as follows,

- Full content in PC
- Outline content in PC
- Highlight content in PC
- Full content in mobile devices
- Outline content in mobile devices
- Highlight content in mobile devices

Once the device and level of content presentation are identified, “Content Delivery Service” in the server will re-assemble content for different learners’ devices.

As for analysis of video screen characteristic and caption, multimedia database planning, and motion picture searching index, this study aims at helping learners to locate the real context in movie databank. For example, movie caption is retrieved in a database. Some stop-words such as “I”, “the”, or “of” will be cut off before words to be statistically analyzed. The results of analysis attain the frequency of nouns and verbs. Once a learner searches a specified word, the server will reply the most related clip to show context from movie databank.

In regarding to multimedia database planning in video retrieval, 3 major components consist of user information such as user_account and user_log, movie caption such as video_list, script_file_list, script_index, and word_list, course-related information such as course_list, and course_content.

Finally, the motion picture searching index consists of 3 modules such as

- Information Retrieval Model
- Semantic Annotation
- Expansion Terms Model

3.2. The Development of Ubiquitous English Learning Environment

Two kinds of learning situation are given: outdoor learning via GPS and Indoor learning via passive RFID. In Fig. 5, a Tablet PC is used as learning device.

In Fig. 6, after a learner logins, UELS will show the listings of content by instructors. Surely, the learner can choose what he/she intends to learn.
To identify learners’ outdoor location, the GPS will be automatically triggered and detect the appropriate location for learning. If the location is not right, UELS will guide the learner to approach the right location in Fig. 7. Until the learners arrive at the right location, the indoor learning via RFID will be active.

Once a learner arrives at the right place, UELS will automatically display the context content for the learner. In Fig. 9, the learner sits in a restaurant and a movie shows the dialogues in a restaurant. Therefore, the learner makes sense for dialogues in a restaurant from the movie database with caption or sub-title.

4 Learning scenarios in medical rescue program

The purpose of this courseware is to provide learners with medical rescue knowledge in Fig. 10. Learners can query something based on patient symptoms or disease for attaining the knowledge of how to rescue patients temporarily and instantly. Also, learners can use GPS to locate the shortest hospital.
The major 3 steps in the medical rescue system can be explained as follows in Fig. 11:

Step 1: Users login and 3 options for users such as Form search, Symptoms search, and GPS.

Step 2: Choose symptoms for searching and attain the information to diagnosis procedures.

Step 3: User gets hospital information near his/her location via GPS searching in Fig. 12 & 13.

5 Results and Discussion

In this study, we create an UELS to fulfill the context learning environment for learning. The summary of this study is shown as follows,

Firstly, the UELS is based upon the wireless and RFID technologies.

Secondly, a scenario on medical rescue has been implemented including software and hardware solution.

For the future study, the courseware design and instructional method can be expanded and explored while the field study must be given to identify the learning outcome or effectiveness.

Bibliography

References:


