Supporting the acquisition of Japanese polite expressions in context-aware ubiquitous learning

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Abstract: It is very difficult for the overseas students to learn Japanese polite expression (JPE) during their course of learning the Japanese language. In this paper, in order to support the foreigners learning JPEs anywhere anytime, we propose a ubiquitous language-learning environment which works without any input of the context information. In the traditional Japanese class, learners only learn the rule of the JPE. This environment can be seen as an extension of the
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traditional education and it guides the learners to use the appropriate JPE according to the different situations in the real world, at the same time, trains students’ ability and skill of using the JPE. We have implemented a prototype system for this environment, named JAPELAS, and JAPELAS2 is a one-to-many system which is upgraded based on JAPELAS and it supports learners interacting with many persons in the same situation. This paper presents the design implementation and evaluation of the JAPELAS2.

**Keywords:** JPE; Japanese polite expression; context-awareness; language learning; authentic learning; collaborative learning; ubiquitous learning.


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### 1 Introduction

Recently, with the evolution of improved wireless telecommunications capabilities, open networks, continued increases in computing power, battery technology and the emergence of flexible software architectures (Lyytinen and Yoo, 2002), wherever and
Ubiquitous computing is a new information and communication technology that utilises a large number of cooperative small nodes with computing and/or communication capabilities such as handheld terminals, smart mobile phones, sensor network nodes, contact-less smart cards, radio frequency identification (RFID), etc. (Sakamura and Koshizuka, 2005).

Moreover, handheld computers may become an increasing choice of technology for classrooms because they enable a transition from the occasional, supplemental use associated with computer labs, to frequent and integral use of portable computational technology (Roschelle, 2003). The mobile phone and handheld terminals such as smart personal digital assistant (PDA), which can communicate in mobile terminal wireless was popular used. One important field where mobile technology can make significant contributions is education (Barak et al., 2007).

Previously, Yano and Ochi (1999) developed a knowledge-base system for Japanese polite expression (JPE) learning, called the Japanese Expressions Dictionary (JEDY) system. The JEDY system is an online dictionary intended to support learning with the changes in polite expressions in different situations. After the user inputs, the information about the conversation partner, the relationship and the situation, the JEDY system shows the learner appropriate examples for that situation. JEDY is a desktop-computer-based system, and it is more like a dictionary.

As for the comparison between dictionary-based learning and authentic learning, Miller and Gildea (1987) worked on vocabulary teaching, and described how children are taught words from dictionary definitions and a few exemplary sentences. They have compared this method with the way vocabulary is normally learned outside the school. People, generally, learn words in the context of ordinary communication. This process is startlingly fast and successful.

Brown et al. (1989) define authentic learning as coherent, meaningful and purposeful activities. When classroom activities are related to the real world, students receive great academic rewards. It includes three types of learning to ensure authentic learning: action learning, situated learning and experimental learning. Traditional learning situations in which students are passive recipients of knowledge are inconsistent with the learning situations of real life (Lave, 1988). Authentic learning allows students to explore, discuss and meaningfully construct concepts and relationships in contexts that involve real-world problems and projects that are relevant to the learner (Donovan et al., 1999). Authentic learning can be very helpful for language learning.

Utilising the pedagogical theory authentic learning, we propose a PDA-based ubiquitous language-learning environment to support the foreigners learning JPE right time and right place and it works without any input of the context information. Learners take PDA with the system, and system guides them to use the appropriate JPE according to the different situations in the real world, at the same time, the system trains students’ ability and skill of using the JPE.

This is an authentic learning environment which allows learners to solve JPE problem in real world to facilitate learning. It is very important to communicate with other people in daily life to learn foreign language well. To gain a better understanding of language, conversation with other people in daily life is very important. The environment can be seen as an extension of the traditional education. In the traditional Japanese class, learners only learn the rule of the JPE, so at the beginning of learning JPE, when the
learners meet the problem in the real world, even if they know the rule well they will not solve it himself. Learners only know the JPE rule is not enough. JPE are strongly influenced by situation, learners should use appropriate JPE according to the situations. It is impossible that Japanese language teacher teach all the situations for the students. They need to practice and get experience in the real life. The environment is to make student learning JPE relevant to real life experiences. We believe authentic learning is very important so that learners construct an understanding of the language in everyday life.

This environment also relate to the collaborative learning pedagogical theory. ‘Collaborative learning’ is an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together (Smith and MacGregor, 1992). Collaborative learning encourages knowledge sharing while making use of the learner’s physical context and mobility. The environment is assumed to get help when the learner need during the communication, learners can reflect by using the history records that were saved in the server. These records were shared to everyone, learners can learn through other learners’ historical learning experience. If somebody cannot understand clearly, he can also download the history recorder and discuss this with someone else.

There are two versions of the prototype system for this environment, one is a one-to-one u-learning system named JPEs learning assisting system (JAPELAS) (Yin et al., 2004). The other is the second version of JAPELAS named JAPELAS2, which is a one-to-many system upgraded based on the JAPELAS. JAPELAS2 supports learners interacting with many persons in the same situation.

JAPELAS2 falls into the participatory simulations and collaborative data gathering tools categories. Furthermore, it allows participatory simulation, and through this way the learners can play roles in social situations according to their learning-interest, such as how to use politeness at the research laboratory of the university or at the place of wedding congratulation or so. As a collaborative data gathering tool, JAPELAS2 collects and shares kinds of the polite expressions and social situations based on the experience of learners. These history records are shared to everyone. The learners review conversation scenes to consolidate memory. The students can make roles by using this system in the class and daily lives; whenever they learn JPE they can get the help from this system.

The outline of this paper is as following: firstly, we describe the elements that cause changes in JPE. Then we illustrate the definition and characteristics of computer supported ubiquitous learning (CSUL), and point out why CSUL relates to language learning. How to design and implementation of the JAPELAS2 in context-aware ubiquitous learning environment is presented afterward, and followed by the system evaluation. Finally, the conclusion and the future work are discussed.

2 JPE

In Japanese language learning, JPE is closely related to Japanese culture. That is to say, the use of JPE is one of the most important parts of Japanese language and it is an indication of an individual’s education or whether the individual is competent for his/her job, for example. In Japan, the first step towards showing job competence is the proper
use of polite expressions. Improper use of polite expressions might lead to misunderstanding in conversation (Yin et al., 2004).

JPE is one of the most important parts of Japanese language and has a close relation with one’s education or growing background and the environment of his work, even relation to his future, which might be admired and might be promoted, for this reason, we consider that Japanese is very different to other languages. The learner must understand not only vocabulary but also the situations in which to use the correct JPE.

JPE is divided into two forms: honorific form and humble form. The honorific form expresses a speaker’s respect for a conversational companion. The humble form expresses the humble attitude of a speaker. For example, the honorific form of the word ‘hanasu’ is ‘ossharu’, and the humble form is ‘mousu’. In this situation, how to use honorific and humble form depending on who is doing the action, if speaker is doing the action himself, then he should use humble form, if other person is doing the action, then the speaker should use honorific form.

Each form is classified into four levels of polite expressions: more formal, formal, basic and casual. Usually, overseas students learn only about the changes of basic forms in Japanese class. However, the abnormity of polite expressions makes these students feel that learning Japanese well is very difficult.

The alteration of JPEs usually occurs in the verb, noun, adjective or adverb. There are two patterns. The first is an irregular change to a different word and the second is a regular change incorporating a prefix and/or suffix. As there are no limitations or patterns to irregular verbs, the change of the verbs is most difficult (Yano and Ochi, 1999). Table 1 shows a level of JPE’s example.

2.1 Factors of changes in JPE

There are three main factors of changes in JPE: hyponymy, social distance and formality (Table 2).

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Level of JPE and its example</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level</strong></td>
<td><strong>Honorific (say)</strong></td>
</tr>
<tr>
<td>Casual</td>
<td>しゃべる</td>
</tr>
<tr>
<td>Basic</td>
<td>言う</td>
</tr>
<tr>
<td>Formal</td>
<td>おっしゃる</td>
</tr>
<tr>
<td>More formal</td>
<td>お話しになる</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Factors of changes in JPE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Factor</strong></td>
<td><strong>Elements</strong></td>
</tr>
<tr>
<td>Hyponymy (social status)</td>
<td>Affiliation, age, position</td>
</tr>
<tr>
<td>Social distance</td>
<td>Colleague, friends, relatives</td>
</tr>
<tr>
<td>Formality (scene)</td>
<td>Ceremony, party, meeting</td>
</tr>
</tbody>
</table>
Hyponymy: generally, people usually use a term of respect to elder or people of a higher social status. Hyponymy rule (Table 3) depends on affiliation, position, length of career, age, etc.

Social distance: JPE is often expressed in the familiar sense. However, the familiar sense is often different from country-to-country. The Japanese familiar sense depends on social relationships, which are classified into an inside group and an outside group.

Table 4 shows the social distance rule, for the same affiliation, in any social relation, the social distance is considered inside or internal distance. As for different the case of affiliation, the types of social relation are such as relatives, friends or others. Its social distance is considered outside or external.

If the relation is family or colleague, then the listener is considered to be a member of a group and a casual level of polite expressions is used. If the relation is not so close, people use formal expressions.

Formality: the situation of conversation influences polite expressions. Japanese people often use more formal expressions in formal situations (giving a talk at ceremonies, writing letters, etc.). For example, meeting rooms are included in among formal situations. If the learner enters a meeting room, more formal expressions are provided there without reference to hyponymy and or social distance.

### Table 3  Hyponymy rule

<table>
<thead>
<tr>
<th>Affiliation</th>
<th>Position</th>
<th>Age</th>
<th>Hyponymy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same (group, department, or organisation)</td>
<td>Upper</td>
<td>Any</td>
<td>Upper</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>Upper</td>
<td>Upper</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>Same or lower</td>
<td>Same</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Any</td>
<td>Lower</td>
</tr>
<tr>
<td>Different</td>
<td>Upper</td>
<td>Any</td>
<td>Upper</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>Same or lower</td>
<td>Same</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Any</td>
<td>Lower</td>
</tr>
</tbody>
</table>

### Table 4  Social distance rule

<table>
<thead>
<tr>
<th>Affiliation</th>
<th>Social relation</th>
<th>Social distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same</td>
<td>Any</td>
<td>Inside</td>
</tr>
<tr>
<td>Different</td>
<td>Relatives, friend</td>
<td>Inside</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>Outside</td>
</tr>
</tbody>
</table>
2.2 Rules for changes in JPE

JPEs rule consists of a social distance rule and a hyponymy rule. The hyponymy rule derives the relation of the social standing between the speaker and the listener focusing on their affiliation, position and age. The social distance rule derives the degree of intimacy focusing on their affiliation and friendship.

As above-motioned, the system will provide an appropriate level of expressions according to the situation. Formality is divided into ‘formal’ and ‘informal’. If it is in a formal situation, there can be any hyponymy and social distance and the JPE level used is considered more formal. As for an informal situation, the hyponymy and social distance varies and the JPE level changes accordingly.

Table 5 shows the rules for the other person in the conversation, when the learner talks to the other person, a different polite expression should be used according to the situation.

Table 6 shows the rules about the learner mentioning the third person in the conversation. When the learner talks to the other person, while mentioning about the third person’s action, different polite expressions should be used. For example, if the learner talks about his teacher (the third person) with the other person (outside), and the action are done by the teacher, even if social status the teacher is higher, the learner has to use cause expressions.

Table 5  JPE rule

<table>
<thead>
<tr>
<th>Formality</th>
<th>Hyponymy</th>
<th>Social distance</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal</td>
<td>Any</td>
<td>Any</td>
<td>More formal</td>
</tr>
<tr>
<td>Informal</td>
<td>Any</td>
<td>Outside</td>
<td>Formal</td>
</tr>
<tr>
<td></td>
<td>Upper</td>
<td>Inside</td>
<td>Formal</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>Inside</td>
<td>Basic</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Inside</td>
<td>Casual</td>
</tr>
</tbody>
</table>

Table 6  JPE rule for the third person

<table>
<thead>
<tr>
<th>Formality</th>
<th>Hyponymy</th>
<th>Other person</th>
<th>The 3rd person</th>
<th>Level for the third person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal</td>
<td>Any</td>
<td>Any</td>
<td>Any</td>
<td>More formal</td>
</tr>
<tr>
<td>Informal</td>
<td>Any</td>
<td>Any</td>
<td>Outside</td>
<td>Formal</td>
</tr>
<tr>
<td></td>
<td>Any</td>
<td>Outside</td>
<td>Inside</td>
<td>Cause</td>
</tr>
<tr>
<td></td>
<td>Upper</td>
<td>Inside</td>
<td>Inside</td>
<td>Formal</td>
</tr>
<tr>
<td></td>
<td>Same</td>
<td>Inside</td>
<td>Inside</td>
<td>Basic</td>
</tr>
<tr>
<td></td>
<td>Lower</td>
<td>Inside</td>
<td>Inside</td>
<td>Casual</td>
</tr>
</tbody>
</table>
2.3 What is new in JAPELAS2

To bring the convenience and to help the learner understand much better, there are some revisions of the system in the following:

- Firstly, improved the infrared (IR) communication interface, when learners use the JAPELAS, they must press four buttons when they exchange personal information each other, they are ‘sever’, ‘client’, ‘send’ and ‘receive’. While if learners use JAPELAS, they just need to press two buttons ‘IRComm’ and ‘Exchange Info’. Then you see, it is much more convenience than before and the windows is also much more friendly.

- Secondly, increased the effect of one-to-many in JAPELAS2. The learner can interact with many persons in the same situation. The JAPELAS is one-to-one system. In JAPELAS, you just only talk to one person, if you want to change another one, you must exchange information again, but in JAPELAS2, you can get all the information before the talk and you can select the one who you want to chat freely. So JAPELAS2 saves the time much more than JAPELAS.

- Thirdly, increased the server in JAPELAS2. The learner can save his historical learning experience into the server, and when they want to review, they can know their historical learning circumstances easily, moreover, they can transit this information to the others and enjoy with them, and learners can use JAPELAS2 to review the history records that they have learned.

- Fourthly, increased much more clearly about the judgement position in JAPELAS2 than in JAPELAS. The JAPELAS2 detects the learner’s location by using not only the RFID tags or GPS but also the learner’s schedule increased.

- Fifthly, JAPELAS only have honorific expression. The system was increased the expression way of humble in JAPELAS2.

- Finally, the JAPELAS2 system is improved with the addition of the rules for the third person.

3 CSUL

JAPELAS2 was developed using the CSUL environment. CSUL is defined as a ubiquitous learning environment that is supported by embedded and invisible computers in everyday life (Ogata and Yano, 2004; Ogata et al., 2008). Ubiquitous learning is the next step in performing e-learning and by some groups it is expected to lead to an educational paradigm shift, or at least, to new ways of learning. Ubiquitous learning has integrated high mobility with pervasive learning environments. While the learner is moving with his/her mobile device, the system dynamically supports his/her learning by communicating with embedded computers in the environment. As for the broad definition of ubiquitous learning, both pervasive learning and mobile learning would be in the category of ubiquitous learning.
3.1 The characteristics of the CSUL

The main characteristics of the CSUL environment are as follows (Ogata and Yano, 2004):

1. **Permanency**: learners can never lose their work unless it is deleted purposefully. In addition, all learning processes are recorded continuously.

2. **Accessibility**: learners have access to their documents, data or videos from anywhere. That information is provided based on their requests. Therefore, the learning involved is self-directed.

3. **Immediacy**: learners can get information from anywhere immediately. Therefore, learners can solve problems quickly. They may record the questions and look for the answer later too.

4. **Interactivity**: learners can interact with experts, teachers or peers in the form of synchronous or asynchronous communication. Hence, the experts are easily reachable and the knowledge is more readily available.

5. **Situated-ness**: the learning can be embedded in our daily life. The problems encountered as well as the knowledge required are all presented in natural and authentic situations. This helps learners to notice the features of problem situations that make particular actions relevant.

3.2 CSUL relate to the language learning

CSUL can support language learning because of the following reasons (Ogata et al., 2006):

- Language learning is lifelong activity and it may need to be supported by computers permanently.
- Language learning takes a place anytime anywhere. Therefore, high accessibility is need to obtain the necessary information.
- If learners have problems in conversations, they will need immediate help.
- As learners may need to interactive support from experts or peers, they have to explain the current situation.
- Language learning is strongly influenced by situations.

“Ubiquitous learning is characterized by providing intuitive ways for identifying right collaborators, right contents and right services in the right place at the right time based on learners surrounding context such as where and when the learners are (time and space), what the learning resources and services available for the learners, and who are the learning collaborators that match the learners’ needs (Ogata and Yano, 2004). As a result, the effectiveness and efficiency of ubiquitous learning heavily relies on the surrounding context of learners.” (Yang, 2006)
4 Design JAPELAS2 used context-awareness

Dey and Abowd (1999) define context as “any information that can be used to characterize the situation of an entity, where an entity can be a person, place, physical or computational object”. They went on to define context-awareness (or context-aware computing) as “the use of context to provide task-relevant information and/or services to a user”. Schilit et al. (1994) point out that one of the mobile computing challenges is how to exploit the changing environment with a new class of applications that are aware of context, and such context-aware software adapts according to the location of use, the collection of nearby people, hosts and accessible devices, as well as to changes to such things over time. They believe context is not only include people’s location but also include other environment’s factors such as people’s social situation.

It is very important for the learners to learn the social situation in Japan in order to use right JPE accordingly. It is very difficult for overseas students to learn JPEs because the expressions change in complicated ways according to the context, for instance, hyponymy, social distance and the formality of conversation (Yano and Ochi, 1999). Moreover, the social distance in Japan often differs from that in the learner’s country. This difference may result in misunderstanding by overseas students.

JAPELAS2 was developed to tackle context-awareness support in everyday conversation without any input of the context information. For different people, at the different places, the JPE should be used differently. The main factors of the social situation are physical location and the personal information. It is necessary for the system to get the physical location and learners’ information.

4.1 Locate physical location

With the growing of home internet appliances and the commodity of RFID tags, it will be possible to realise the intelligence exchange with surrounding matters, and also the realisation of cordless navigating global positioning system (GPS) based on satellites. Theses mobile technology is usually used to design JAPELAS2 to locate the location.

The system used [SCHEDULE] in PDA, RFID tags and GPS to locate the learner’s location automatically, such as at the lab or at party.

At first, the learners use the [SCHEDULE] to locate the learner’s location. The time and location are stated in the schedule, so the learner’s location can be identified as per the time in the schedule.

If the [SCHEDULE] fails to locate the location, by the failing message, the learner will locate location by RFID tags or GPS. Systems based on the GPS (Enge and Misra, 1999), while very useful outdoors, and are ineffective indoors because buildings block GPS transmissions. RFID tags are used indoors, whereas GPS is used outdoors. RFID tags are attached to the entrance of each room to identity the rooms, so system can get RFID tags’ code.
4.2 User information

When the learner communicate with the other person, the learner should exchange the personal information, then the system will give the right polite expression depend on the other person’s information. To exchange the personal information, the learner must specify their personnel profile such as name, ID, role, affiliation, e-mail, etc in the required properties. The personal information will be saved at the learner’s PDA, and only the learner himself can read this information.

Before using the system, user should exchange the personal self-information. We use IR communication port of PDA to exchange personal information. Each peer act as both client and server, each peer can access and be accessed. The other person’s information can be saved to the system. If the learner want to save the other person’s information, she/he should get the agreement of other person, if the other person agree it then the other personal information will be classified and saved to the database. The class is referred to the relationship class, such as friend, family, teacher, etc.

5 Implementation of the JAPELAS2

A prototype system was developed on Pocket PC 2002, server, IR communication, RFID tags reader/writer, GPS and personal handy system (PHS). The program has been implementing using Embedded Visual C++ 4.0. As mentioned above, the change of the verbs is most difficult. Due to the small-sized screen of PDA, we develop the system that only support the change of verbs.

5.1 Architecture of the JAPELAS2

The architecture of this system is shown in Figure 1, this system consists of two parts, one is the server part and the other is the PDAs part.

5.1.1 Server part

Server is implemented on a desktop computer. Server is used to save the study history records. When data server receives the messages sent by PDAs, the module will save the messages into the corresponding table, on the contrary, when data server receives the reading request, the module will send the messages to the PDA. Server has four function modules as following:

- **Location manager**: saving and reading the location information.
- **Learner Info manager**: helps the learners to save and read the learner message.
- **Education manager**: saving and reading the learning materials.
- **The server communication**: manages the communication with the PDA.
5.1.2 PDAs part

There are seven function modules in the PDAs part.

- **Learner-module**: it contains the learner’s profile, such as name, age, gender, year in school, friends, relatives, etc. In addition, this module deals with the comprehensive level of each expression. Before using this system, each learner enters these data and save his messages into the database. Moreover, the system records the information of the other learners that the learner has already met. The learner can use this information for individual learning. By choosing someone as a conversational partner, the learner can learn polite expressions alone through the simulation.

- **Environmental-module**: physical location is connected to this module. It contains learners’ location information, schedule information, longitude and latitude information and RFID tags’ code information.

- **Educational-module**: this module manages expressions as learning materials. The teacher enters the basic expressions. Both learners and the teacher can add or modify expressions during system use. All the verbs’ level of JPE is connected to this module.
• **IR-communication**: IR requires no fixed infrastructure and no configuration. In addition, IR simplifies the designation of communication targets. Instead of entering target names, learners can point to the person.

• **Location-manager**: It detects the learner’s location using schedule, RFID tags and GPS.

• **JPER manager**: Based on polite expression rules, using the location information and personal information, this module provides appropriate expressions for each situation.

• **Client-communication**: It serves for the communication with the server.

### 5.2 User interface of JAPELAS2

As shown in Figure 2, those are interface for learners to learn polite expressions.

- **Info**: the personal information and the situation of conversation influence polite expressions. At first, learner must start the info window (A). There are two parts in this window, one is the personal information and the other one is location. The system gets the personal information by the IR communication, the speaker can connect with surrounding people and exchange personal information each other, and these information will be save to his PDA.

- **Expression**: the surrounding people will be shown in the top of expression windows (B). The learner can choose conversational partners freely, and the propriety polite expression will be showed for the learner. JPE depends on the person who is doing the action, so we will show user two kind of form. One is honorific form and another one is humble form. The data of the partners is stored into the database in order to facilitate personal learning. At the same time, the personal message and the used verb are sent to server.

- **Relationships practice**: the learner can choose two persons from the database and can simulate conversation. It is very important for learners to master human-to-human relationship. The learner can practice JPE himself by using JPE practice window (C). When the learner chooses personal information from the history records in server, the window will display the right human relations in the graph.

- **JPE-practice**: The learner can use the history records that were saved in the server. Those records include personal information, location information and used verb, etc. After input the date, the learner downloads these records of this date, and review JPE by JPE practice window (D).
5.3 Scenario

Here is a scenario to explain how to use the system. There are four learners, name them X, Y, Z and W. Every user has a PDA, with his information already into the database, for example, name, grade, age, etc. Before entering the room, learners should get the location by RFID tags (see Figure 3), then X, Y, Z and W exchange their personal information using IR commutation each other (see Figure 4), and everyone gets all the others’ information, and this information will be shown in the top of expression windows, then every user choice the person he wants to talk. Finally, they communicate with each other from the prompt by the system.
Figure 3  Locate the location (see online version for colours)

Figure 4  Exchange the personal info (see online version for colours)

Figure 5 shows a scene of learning polite expressions with the system. As the learners in a room, it is an informal situation. When X talks to Z, the system tells X a casual expression. That is because the grade of X is older than Z.

On the other hand, when X turns to Y, the system tells X a formal expression. That is because the grade of X is lower than the year (grade) of Y, and when X turns to W, the system tells X a basic expression. That is because they are of the same condition. When Mr. X talks to Mr. Y. and Mr. Z at the same time, the system tells Mr. X a formal expression, because in this case the higher level should be used. For example, X asked to Y and said, “明日は研究室にいらっしゃいます (irasshaimasu)か (Will you come to the lab tomorrow?)” and Y answered, “はい、明日はくる(kuru). (I will come tomorrow.)”. There two expressions of the word ‘come’, they are ‘irasshaimasu’ and ‘kuru’. The ‘irasshaimasu’ is a formal expression and ‘kuru’ is a casual expression.
6 Experimentation

There are two experimentations that were done to evaluate the system. In Japan, a growing number of young people are unable to use appropriate polite expressions, thus this system may be useful even for young Japanese. About 18 Japanese high school students (the first experiment) were arranged to evaluate the JAPELAS using a questionnaire. They commented that it is better that they want to interact with many persons (one-to-many) in the same situation, but this system only supports interacting in pairs (one-to-one). According this experimentation, the system was upgraded to a one-to-many system, this is JAPELAS2. This experimentation was done 45 min.

About ten overseas students were arranged to evaluate the JAPELAS2 using a questionnaire in Japanese classes, there are two Japanese teachers guide them to use the system. All of the overseas students were taking a Japanese language course before entering a master’s or doctoral course at a university. The overseas students were from China, Korea, Mexico, Indonesia, Bangladesh and Egypt. About seven students were taking a beginner level course and three students were taking an intermediate level course for Japanese language learning. Two different Japanese teachers taught the courses. Although none of the Japanese or foreign students owned PDAs, 56% owned computers. This experimentation was done 90 min.

6.1 The design of the experimentation

The experiment was designed by scaffolding technique. The ‘scaffolding’ comes from the works of Wood et al. (1976). Scaffolding, as provided by human tutors, has been well established as an effective means of supporting learning (Roschelle, 2003). The timing of the scaffolding is very important. When learner can take the task himself, we should begin the process of ‘fading’, or the gradual removal of the scaffolding, which allows the student to work independently. The students use the system in the following steps.
Step 1 The teachers teach the rule of Japanese polite express then introduce how to use this system.

Step 2 Students play in the roles as a brother, friend, teacher or guest. Teacher helps them at the same time so that the students can make improvement through the discussion. In this step, the learners play the roles indoor and help each other under the guidance of the teachers.

Step 3 When the students master the rules to a certain degree, we give some takes and ask the students to practice outside with the PDA, for example, let the student take the PDA to buy something in the shop, or borrow a book in the library. This system only records the information and points the position to the one who spoke. But which level should students express depend on the judgements by themselves. This is because a beginner cannot change forms of abnormality verb, so when the learners enter the level and verbs into the PDA, this system will present the changed forms accordingly. Then the learners record the conversation with others and bring it to the class then teachers and the students will discuss and correct it together.

Step 4 At the end, those records are saved to the server. And the learners will go through the history record to review the scene and then do reflection. The learner can also download the personal information and place the information to practice the JPE.

6.2 The tasks used in the evaluations

There are three cases about our evaluation simulation. User uses the system at the university, or at the part-time job ahead, or at home, which played the roles in the different location (see Table 7). The users do the tasks, which include such activities as:

‘Go to the university library, ask the staffs how to borrow the books, and ask about library opening times and closing times’. Or ‘Go to the office of the teacher and ask the teacher to correct Japanese paper’. The teachers and staffs were all given PDAs before.

6.3 Result of the questionnaire

After the experiment, the users evaluated the system by nine questions, which were graded on a scale, with one being the lowest and five being the highest. The average score given by Japanese students was 3.8 and the average score given by overseas students was 4.0. A system evaluation questionnaire was given out (Table 8).

Figure 6 shows the results of the evaluations by the questionnaires. The results for Question (1) indicate that the system provided appropriate information for the users. The results for Question (2) reveal the importance of adequately explaining how to use this system. In the first experiment, before using the system, we did not provide a good explanation about how to use the system, so we did not get good feedback from the Japanese students. However, in the second experiment, as we have explained that how to use the system to the overseas students, the system received a better ranking. Therefore, we found that it is very important to explain the how to use the system.
Table 7  Evaluations simulation

<table>
<thead>
<tr>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>University</td>
<td>Part-time job</td>
</tr>
<tr>
<td>Self</td>
<td>Student</td>
<td>Staff</td>
</tr>
<tr>
<td>Others</td>
<td>Teachers, staffs</td>
<td>Guests, boss, colleagues</td>
</tr>
</tbody>
</table>

Table 8  Questionnaire

<table>
<thead>
<tr>
<th>Questionnaire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
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<tr>
<td>Q2</td>
</tr>
<tr>
<td>Q3</td>
</tr>
<tr>
<td>Q4</td>
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<tr>
<td>Q5</td>
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<tr>
<td>Q6</td>
</tr>
</tbody>
</table>

Figure 6  Result of the questionnaires

In terms of language learning, the results for Question (3) indicate that this system was quite useful. A learner commented that the system made understanding the appropriate level of politeness easy by changing roles and situations. The results for Question (4) indicate that we should increase the response of the system. Questions (5) and (6) indicate that users were very interested in this system and would like to continue using it. Most of learners commented that they could learn how to use the polite expressions using this system. From the result Questions (2) and (4), the usability of the JAPELAS2 is higher than JAPELAS.
6.4 Comment

After the experiment, the users evaluated the system by questions, which were graded on a scale, with one being the lowest and five being the highest. According to the questionnaire we know the system was quite useful. A learner commented that the system made understanding the appropriate level of politeness easy by changing roles and situations. Most of learners commented that they could learn how to use polite expressions using this system.

As motioned above, for the experimentation of the JAPELAS2. Two levels of users to participate in the experimentation (beginner and intermediate level course). For the beginner level course, they just learned the JPE, so they commented that using the system to learn JPE is interesting and they like the way of using system to learn JPE. For the intermediate level course, although they learned the JPE before, JPE is complicated that they were uninterested in learning it, they almost forgot JPE all and they commented that through using the system, they can learn and review the JPE anywhere, anytime, it is useful.

For the JAPELAS, the users commented that they need to interact with many persons in the same situation. For the JAPELAS2, nobody makes the request again, they commented that they got all the others’ information one time in the same situation, and then they could choose the persons in the expression windows, system response time did not effects using the system. It means the one-to-many system is more appropriate to learn JPE.

Teachers commented that learning the Japanese language is very difficult due to the relative level of politeness, which other languages do not have. However, the system is very useful because the system automatically provides the correct relative level of politeness as derived from the personal information and the situation.

7 Conclusion and future works

To support the foreigners learning JPE, a PDA-based context-aware language learning support environment was proposed. This environment supports the learners to learn JPE according to the different situations in the real world. There are two version of the prototype system for this environment. In this paper, design, implementation and evaluation of JAPELAS2 are presented.

From the experiment, we found the system provides the correct polite-expression based on hyponymy, social distance and situation through the identification of the target user and the location. The experiment showed that the system was quite useful and using this system made understanding the appropriate level of politeness easy by changing roles and situations. Compare the two experiments, we found the usability of the JAPELAS2 is higher than JAPELAS and JAPELAS2 is more appropriate to learn JPE than JAPELAS.
To examine the effectiveness of this system, we are planning to improve the system and ease of usability and do a medium- or long-term experiment to evaluate the system. We will do an experiment to compare the JAPELAS and JAPELAS2. We are also planning to do a usability test for the system according to software engineering standards. Finally, we will use this system in the class to get more in-depth feedback from the students in order to test and improve it to achieve the goal of using it in class. These works will be a new topic to be explored in the future.

References


