An Experience-Oriented Language Learning Environment Supporting Informal Learning Abroad*

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This paper presents a study on the potential of ubiquitous language learning environments that utilize the benefits of mobile devices such as smartphones with global positioning system (GPS) functions. Recent research has emphasized the importance of taking account of informal learning – learning that happens outside the classroom, in students' everyday lives, when designing learning environments. The learning environment proposed in this study connects classroom learning with learners’ real-life experiences, supported by smartphones, which detect the learners’ location and supply them with multimedia content that matches their real-time situation. The paper provides insight into the concept, implementation, and evaluation of the project.

**Key words**: language learning environment, informal learning, smartphone, e-learning, ubiquitous computing

1. INTRODUCTION

In order to learn a new language, learners need to use it. Therefore, one of the most important issues in foreign language education, one could conclude, is how to provide learners with an environment in which they can proactively and meaningfully utilize the target language. Learning, however, does not only happen within the confines of the classroom, but also in “informal” learning situations outside of it. Successful language learning thus also depends on the quantity and quality of this informal learning.

At Shonan Fujisawa Campus of Keio University, researchers and educators have been working on designing computer-based language learning environments to provide language learners (mainly of German) with learning opportunities outside the classroom that are linked to classroom content (Waragai et al. 2009; Kiyoki et al. 2010; Waragai et al. 2010). Utilizing the functions of mobile devices, particularly cell phones and smartphones, these learning environments aim at enabling learners to engage in learning “at any place and at any time”, and in ways that create links between the learning inside the classroom and the students’ real life experiences, allowing learners to re-contextualize classroom content in situated learning: Learners are supported in finding out how they can use what they learnt in the classroom in everyday life situations; and conversely, in identifying real life situations that they can already master by using what they learnt in class. This approach has become possible with the widespread use of mobile devices such as smartphones with GPS functions. Although still incomplete, wireless internet environments have significantly improved and expanded. On the other hand, wide-range usage is still limited because of rate structure issues.

This paper discusses the theoretical background of this study, presents the details of the design of a ubiquitous language learning environment supporting informal learning, and provides an outline of the future prospects of this research.

2. LEARNING EMBEDDED IN EVERYDAY LIFE

2.1. Changes in Learning Perspectives

The paradigms of learning have changed drastically during the past several decades. Whilst the “instructivist” approach regarded learning as...
the act of implanting objectively established knowledge into the learner’s mind. Social Constructivism defines learning as an individual and active process of knowledge construction, which happens through interaction with others. In the process of interaction, learners acquire knowledge by fitting in new information with their hitherto acquired knowledge, and thereby rearranging their individual construction of knowledge (Kubota 2000; Wolff 2002).

Designing a learner–centered language learning environment, based on the rationale of social constructivism and fostering self-directed learning, should not only give learners the opportunity to collaborate on projects with an outcome, but also take the notion of “authenticity” into consideration: learning should happen in the context of society, and enable learners to interact in real-life situations as much as possible (Rüschoff and Wolff 1999).

Amidst the change of learning paradigms, the notion of Situated Learning by Lave and Wenger (1991) represented an approach that differed from previous learning concepts. This particular perspective on learning is based on the premise that learning cannot be removed from the context of societal practice: learning occurs through participation in a “community of practice”, rather than through the simple absorption of abstract knowledge separated from real societal contexts. This perspective offers an important implication in conceptualizing contemporary foreign language learning. In other words, “classroom learning” based on a carefully arranged curriculum is, of course, an element that helps to form the backbone of language learning at the university level. However, the practical promotion of “learning embedded within the situation” of society should also be considered. Therefore it seems necessary to support both types of learning and explore possible technical solutions that can actualize the potential of a comprehensive learning environment bridging the gap between the two concepts.

With regard to research on e-learning systems in a ubiquitous environment, Jamuna and Ashok (2009) indicated that there has been progress toward linking existing e-learning systems in response to the objectives of the learner through service-oriented architecture (SOA) and the cooperation of those e-learning systems. The system we have developed has implemented the function of iteratively performing foreign language learning by interacting with existing social networking sites (SNS) and SOA systems. Zheng et al. (2008) proposed an SOA-based e-learning system and an information management system for this purpose. In addition, they describe a method of flexibly integrating existing e–learning systems in accordance with the objectives of the learner. Styliadis and Pehlivanis (2006) and Styliadis et al. (2006) provide examples of ways to individualize e–learning materials to meet the situation and preferences of the individual user. These methods...
individualize materials by using information obtained through Geospatial Information Systems (GIS), and there is high relevance with the methods described in this paper.

2.2. Ubiquitous Environments and Foreign Language Learning

In their discussion of current tendencies and future prospects in mobile language learning, Kukulska-Hulme and Shield (2008) indicate the importance of encouraging cooperative learning through the use of multimedia and of supporting learners in their knowledge construction. Ogata and Yano (2004a) provide an example of pioneering research in computer-supported ubiquitous language learning environments. In this study, the authors propose the language learning environment CLUE (Collaborative Learning support system in Ubiquitous computing Environments), which is directed at learners of Japanese in Japan and comprises three subsystems: 1) a system for providing learners with expressions according to places they access in their everyday lives; 2) a system for assisting learners in choosing the adequate level of politeness towards their interlocutors, based on an analysis of the social relationship between the learner and the people around him/her; and 3) a system supporting vocabulary learning, which uses radio frequency identification (RFID) tags on daily items to introduce their Japanese names to the learners. All three subsystems utilize personal digital assistants (PDA). Ogata and Yano (2004b) demonstrate the effectiveness of CLUE in supporting collaborative learning through knowledge sharing. This research is related with our paper in that learners’ experiences in their daily lives are being connected with learning through ubiquitous computing. In addition, the learning support systems presented take into account the immediate situation of the learners and the effectiveness of collaborative learning. However, our research aims at bridging the gap between content learned in the classroom and the environment outside the classroom, and link both learning instances in close-knit ways. It has often been pointed out that the process of reconstructing knowledge on the basis of existing knowledge is important in foreign language learning (Rüschoff and Wolff 1999). In accordance with that insight, the objective of our system is to support learner-centered and self-directed learning in line with the situation, by relating knowledge that is learned in the classroom to practical knowledge in “authentic” situations outside the classroom. With regard to designing a learning environment that allows revisiting content learnt in the past, our approach is related to the research of Hata et al. (2010). Our system not only utilizes data accumulated on the learners’ activity history via GPS to supply them with individualized feedback, but also provides fundamental data for the development of an additional learning support system such as that outlined in the section “Prospects for the Future.” Furthermore, one characteristic of this study is that it has been conceived and conducted from the perspective of not only information engineering researchers, but also experts in the field of foreign language education, so that findings of the study of Second Language Acquisition could lead the design and evaluation of the language learning environment proposed.

2.3. Foreign Language Learning and Informal Learning

It is commonly accepted that ICT (Information and Communication Technology) is extremely useful in actualizing learning environments based on the principles of Social Constructivism and the ideas of Situated Learning. It is for that reason that this project first set out to bridge the gap between formal, curriculum-based learning in the classroom and informal learning in the societal context with the help of a computer–assisted learning environment. With that objective, we made learning material, based on classroom learning content, available for mobile learning online, so that learners would be able to access these learning aids independent of place and time. Furthermore, we tried to map learning contents to real–life locations/situations, so that learners would be able to create links between items they had learnt in class with societal contexts where these items might be of use. The details of this learning environment will be pointed out in the next chapter.

In addition to the theoretical underpinnings discussed above, one motivation for us to execute this project was provided by the results of a survey about learning behaviours which was conducted as part of this research, targeting German language learners at Keio University Shonan Fujisawa Campus. In the survey, conducted in May 2008, students were asked, amongst others, about the places and situations that they commonly used for language learning. The option chosen the most often was “home
(using Internet)”, followed by “transit time, such as in train or bus” (Waragai et al. 2009). This result is probably related to the distance between the campus and the city. However, the survey made it clear, that a large number of students study outside the classroom while commuting or in “gaps in daily life” as they are waiting for a bus or train, instead of studying at home, in school, or in a library. As opposed to the “formal” learning that occurs in classroom situations, “informal” learning generally refers to knowledge or skills gained individually in a social context. The survey results revealed that in the time of digital music players, cell phones, and smartphones, informal learning, conducted autonomously by students in the “casual gaps in daily life” on public transport or during wait-time, has become a major part of independent learning. No longer are students sitting in front of a computer at home or at the university library.

Reflecting the environment that students learn and live in, the learning support system we propose here does not provide learning opportunities at home or in the library, but instead creates practical learning opportunities in everyday life situations. In other words, we aimed at designing a language learning environment that makes daily life a potentially continuous learning experience.

3. EXPERIENCE-ORIENTED LANGUAGE LEARNING ENVIRONMENT

3.1. Project Overview

The experience-oriented ubiquitous language learning environment presented here was developed in a process of collaboration between faculty project members at Keio University Shonan Fujisawa Campus, and undergraduate as well as graduate students there. The overall concept is shown in Figure 1.

This model illustrates a learning environment in which time and space in a learners’ daily life are connected to learning materials. We assumed that the learners possess a mobile device with GPS functions. In fact, during this project’s early stages, a campaign was carried out on our campus to provide students with a smartphone. The device—a smartphone in this model—autonomously detects the learner’s current location and situation through regular position sensing. Then, in response to the student’s location, related materials are selected, connected, and automatically distributed. The materials to be distributed are saved in various data formats—text, audio, still images, and videos—subdivided and classified by function, and stored in a database. In addition to the prepared materials, the system can also distribute other content data by connecting with an external search engine.

Thus, if, for example, a student is waiting at a bus stop and her current position information is detected, the system automatically makes available for viewing on her mobile device a video lesson that she has previously studied in class—“Asking for directions at a bus stop.” Thus, the expressions she studied in the classroom now become connected to the actual social context, where she can explore the way they are used. The sphere of formal learning and the daily world of the learner are linked. It is probable that this kind of connection with daily life “authenticates” the learning material and shapes the learner’s meta-level awareness.

3.2. System Design

By introducing e-learning systems into a ubiquitous computing environment, students, who use smart devices such as smartphones and tablets for learning, can be enabled to apply learning materials and content to their daily life, and can apply their knowledge of daily life to their learning content in ways that increase their learning awareness. E-learning systems in a ubiquitous computing environment make it possible to organize learning materials in response to a student’s situation (context) and by automatic distribution of those materials in response to the context. However, the relationships of the learner’s experiences and the learning materials are manifold; therefore, it is difficult to define static connections between those two variables. Furthermore, in foreign language learning, it is desirable to distribute materials that satisfy individual preferences to maintain learner motivation; however, it is difficult to statically compose materials reflective of an individual’s preferences. Thus, we have designed our ubiquitous experience-connected learning environment with the following three functions:

- Situation-Dependent Learning function, through mapping of learner knowledge onto actual life space. An important characteristic of this system is that it provides learning materials through the automatic invocation of multimedia databases and knowledge retrieval.
- Selective dissemination of learning materials is triggered by situation changes
An Experience–Oriented Language Learning Environment Supporting Informal Learning Abroad

detected via the smartphone’s sensors. The system uses that event as a trigger to invoke a multimedia database in which materials are stored, and then automatically distributes related media materials to the target user. In this way, the system realizes a learning function that connects with the learner’s experience and situation.

- Personalized and Collaborative Learning Support functions, emphasizing the learner’s cognitive process. As shown in Figure 2, this system provides functions for the learner to “Bookmark” and categorize videos delivered, manage unviewed materials by registering them in the “View Later” list, and stop distribution using the “Don’t Watch Any More” list. Through these functions, each learner can restructure video materials on the basis of her/his individual experiences and construct her/his individual independent approach to learning. Additionally, the system supports collaborative learning, by allowing the import/export of bookmark information among learners’ profiles.

- Spatial and Temporal Situation–Aware Learning Community Formation function. As shown in Figure 4, this system implements a function by which learners can share their questions about and reactions to the video materials and advise other learners through an SNS. In particular, by clicking on the Tweet button displayed on each video playback page, the user can post a message about the respective video to the Twitter microblogging service. When a message is posted, the message is automatically sent to the system management account, where all messages are collected. Thus, instructors can access
feedback from learners and follow the messaging among the learners. This function gives instructors a real-time insight into each learner’s learning activities, even during longer stays abroad such as a summer course in the country of the target language, and makes it possible to provide long-term feedback, and to improve materials on a continuous basis.

This system operates in the following four steps: (1) The Student’s smartphone invokes sensors to extract his real situation, by using the camera, GPS, and electric compass components. The system then determines the end-user’s context through real-time analysis and processing; (2) the system calculates the correlation between the extracted context and the various language learning materials stored in the knowledge base; (3) the system automatically disseminates language learning materials based on the end-user’s context; and (4) the system reports the learning activity of individual users to a server computer, performs detailed usage logging (learning history storage) for each user, and conducts granular learning history collection. Through these steps, learning content evaluation from the learning and research theme settings—one part of the foreign language learning process—is actualized in daily life space as practical learning and research.

3.3. Implementation of the Prototype System

This section describes the implementation of a web application system that automatically distributes media data targeting smartphones with GPS functions, as a prototype of the proposed system.

The prototype system distributed learning materials that targeted a small number of learners and made learning effectiveness and individualization compatible. The system is a three-level architecture web application consisting of a web interface, web server, and database server. As an important part of its functionality, this prototype system uses an HTML5 browser supported by smartphones and AJAX functions and creates a cross-platform e-learning environment.

Examples of the system’s learning materials disseminations are shown in Figure 2 and 3. First, using a web interface, the system acquires GPS information from the learner’s mobile device. The system then generates metadata expressing the learner’s experience based on position and point in time. After that, the system converts the generated experience data by using a knowledge-and-experience-linkage matrix; next, it generates learning content metadata based on that experience. Finally, from a database, the system acquires learning materials related to the learning content and distributes them to the learner via a web interface.

The system has a function for dynamically distributing learning materials to the learner in response to changes in the learner’s space and time context. To implement that function, this prototype system operates with a position information-connected web interface using Geolocation API and Ajax. This web interface uses Geolocation API to acquire learner position information automatically and update position information in real time, based on the learner’s movements. In addition, it uses AJAX functions for automatically editing parts of a web page to update the learning materials distributed to the learner and modify them into materials reflective of the learner’s current position. Thus, the learner can use this system through the same operations as a client application, without installing specific software. We used Google Maps JavaScript API V3 and jQuery to implement the specific Geolocation API and Ajax framework, respectively.

The automatic distribution of media data in the implemented prototype system happens in the following sequences:

Step-1: The system acquires the unique identification number of the connected user, the device’s position information, and the current time.

Step-2: In addition, it generates the “experience characteristic features” (defined below) from the user’s position information and current time. It generates a query from the GPS information and time of use from the learner’s mobile device. It also generates an experience metadata vector, \( V \), from the learner’s position information \((x, y)\) and time of system use.

\[
v = \left[ \sum_{i=0}^{k} M_{(a_i)}, \ldots, \sum_{i=0}^{k} M_{(n_i)} \right]
\]

In this formula, from (among the matrix in) any vector \( M \) in the experience metadata vector group \( M \), \( M \) represents the matrix that is below the threshold of the Euclidian distance between the learner’s position information \((x, y)\) and the position information of the various experience
metadata $(X(M), Y(M))$ and is comprised of the $K$ vectors, in which the user’s time is contained in the period between the experience metadata’s start time $(T_{\text{start}}(M))$ and end time $(T_{\text{end}}(M))$. The system calculates the knowledge in the metadata vector groups comprising $M$, and generates a multi-dimensional synthetic vector. Then, the system sets this synthetic vector as a metadata vector representing the learner’s real-time experience (experience characteristic features).

Step-3: The system uses a knowledge–and–experience linkage matrix in response to the user’s identification number and then calculates the learning content based on its acquired experience characteristic amount. The knowledge–and–experience–linkage matrix is $n \times m$, and each element is the value $r_{i,j}$ from 0–1, representing the relationship between the foreign language vocabulary item, $i$, and the experience, $j$.

$$
M = \begin{bmatrix}
  r_{0,0} & \cdots & r_{0,m} \\
  \vdots & \ddots & \vdots \\
  r_{n,0} & \cdots & r_{n,m}
\end{bmatrix}
$$

Here, 0 indicates that the foreign language vocabulary item and the experience are not related; 1 indicates a strong relationship. Using this knowledge–and–experience–linkage matrix, it is possible to use vocabulary as a mediator to connect experiences of daily life to foreign language knowledge. The following example matrix (Table 1) shows the connection between experiences of type $m$ ($e_0 \ldots e_m$) and foreign language knowledge of type $n$ ($k_1 \ldots k_n$).

Table 1. Example Matrix Showing Connection to Foreign Language Knowledge

<table>
<thead>
<tr>
<th>Type of Experience</th>
<th>$e_1$</th>
<th>$e_2$</th>
<th>$e_3$</th>
<th>...</th>
<th>$e_m$</th>
</tr>
</thead>
</table>
| Vocabulary Showing Foreign Language Knowledge
| $k_1$               | 1     | 0     | 0     | ... | 0.1   |
| $k_2$               | 0     | 0     | 0.4   | ... | 0.2   |
| $k_3$               | 0.1   | 0.4   | 0.25  | ... | 0     |
| ...                 | ...   | ...   | ...   | ... | ...   |
| $k_n$               | 0.43  | 0.33  | 0.11  | ... | 0.04  |

Step-4: The system calculates a correlation coefficient of the calculated learning content and educational material metadata; it ranks the educational material in descending order of the correlation coefficient. As a correlation coefficient, the following shows how the system calculates the internals of the user’s experience metadata, $v$, and the metadata supporting the education materials, $m$:

$$
in\text{ner}_\text{product}(v,m) = \sum_{i=0}^{k} q_{i} \cdot v_{(i)}$$

Step-5: The system distributes the top-$k$ ranked educational materials to the user via a web interface.

3.4. Operation and Evaluation

To research into how learners would make use of this type of learning environment, we started the implementation and evaluation of the system in 2009. The contents prepared for distribution consist of video data from video materials used in class. This material was partitioned in two different ways: according to “scenes”, in which case a video presented a situation completely, and according to “communicative functions”, in which case only the most important linguistic acts of a situation were presented in their immediate context. Next, we “mapped” these data to locations where a corresponding situation might occur and the respective linguistic acts might be relevant. The system specifications were such, that when the learner with a mobile device arrived at a certain place, content aligned to that place would appear on the device.

In a first trial sequence, we used locations on our own campus as a real-life learning sphere; in the second sequence we chose two locations in Germany, where our students took part in language classes during summer school, as learning spheres: the area around the campuses of the universities of Munich and Bonn (Figure 5). In both cases, we tried to map the learning content onto the locations as accurately as possible, judging from where the students might be confronted with what type of situation. For example we linked the area around the student cafeteria at Munich University to the video “Conversation before entering the student cafeteria.”

The aforementioned function of the system, to collect data about each learners’ learning activities was one important source of data for our analysis.
As illustrated in Table 2, we divided this operation/evaluation into three steps. During the first operation in the 2009 spring semester, using a wireless network environment, we tested the system with 12 informants, all of which were learners of German on our campus. For this operation, the informants used an iPod touch (Apple) as their end device. After a 3-week usage period, we examined the informants' patterns of use of the system, possible changes in their motivation for language learning, and a possible interconnection between the participants' daily lives and the learning opportunities provided by the system in qualitative interviews. Unfortunately, we were unable to identify a clear connection, mainly because in 2009, the iPod Touch had no GPS functionality, making position information queries impossible. In addition, iPhones (Apple) with GPS functionality had not sufficiently penetrated the student market at that time.

We conducted the second operation from August to September 2009, with three learners participating in language classes during summer school in a German-speaking environment (one in Bonn, two in Munich). As roaming contracts were still a problematic issue at that time, instead of smartphones, we used VAIO type P (Sony) ultra-light laptops with GPS functionality as the user device. After the three participants returned to Japan, in October 2009, we carried out qualitative interviews with them, inquiring mainly about four points: their usage frequency; places of use; changes in their learning awareness; and things that they noticed. However, it became clear that, at this stage, contrary to our expectations, the device did not become a way of linking daily life with classroom learning. For such links in real time, the laptop was too big: its portability was inconvenient, for instance, for accessing programs while walking or waiting at a bus stop. The participants reported psychological resistance toward launching a PC device to access learning materials in all the places they went.

Taking into consideration this second operation and evaluation, we implemented a third one in 2010. The implementation period was from July to September. The participants were four German language students who possessed iPhones. Table 3 shows the background data of each student participant.

Using access–history data from the iPhone itself, it is possible to ascertain when and how many times each participant actually viewed which

<table>
<thead>
<tr>
<th>Step</th>
<th>Place of Operation</th>
<th>device used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Japanese Language Environment (On Campus)</td>
<td>iPod touch</td>
</tr>
<tr>
<td>2</td>
<td>German Language Environment 1 (Bonn, Munich)</td>
<td>VAIO type P</td>
</tr>
<tr>
<td>3</td>
<td>German Language Environment 2 (Bonn, Munich)</td>
<td>iPhone</td>
</tr>
</tbody>
</table>

Fig. 5. Data Mapping Example
content. Figure 6 shows the number of times informant 2 and 3 accessed content in one day, by time period. Informant 1, 2, and 4 attended the same course for about three weeks. Therefore, considering the importance of avoiding bias when activity patterns have similar characteristics, we selected informant 2 as a student taking classes in Munich, and informant 3 as a student taking classes in Bonn. As Figure 6 demonstrates, the analysis of both informants’ usage shows a high peak thrice in one day. The peaks occur from 7 a.m. until noon, at noon for a relatively short time, and again from 7 p.m. until midnight. The learning materials accessed were videos from the textbook “Modell 3” ("Modelle" textbook series: Riessland et al. 2007, 2005, 2006). Modell 3 prepares students for situations that they might occur while attending language classes in summer school in Germany. The fact that the learners were referring to these learning contents can be seen as pointing to a learning activity that simulates or reflects an real or expected encounter in their environment. The three peak usage times in the morning, common in both informants, seem to align with class times at the informants’ respective universities (Munich and Bonn) and their break periods. The noon and evening logging data can be similarly interpreted as teaching material access via the participants’ iPhones during their respective “in between times.” To perform this analysis, we used not only the logging data but also a written survey, with the participants answering a series of questions via mail from their respective destinations. In addition, we conducted follow-up interviews after each participant’s return to Japan.

After the semi-structured follow-up interviews, we transcribed the interview data and analysed them, by looking for recurring statements. What could be seen as shared not only between informant 2 and 3, but also in the logging history of informant 1 and 4 is that all were using their “in between time” to access learning materials. In particular, the analysis confirmed a tendency of concentrated access in periods before class, during breaks, and after class. It was also characteristic during those times that learners used a certain time period to view various contents. This could indicate that the “real-time” experience of daily life and the access to learning materials aligned with these experiences do not necessarily connect.

The results of the data analysis and follow-up interviews reveal that the learners did rather not view the learning materials on the “spot”, but tended to access the teaching materials as “preparation” for situations that they expected to encounter later that day or as “confirmation,” revisiting situations they had encountered earlier that day. Thus, it seems that learners perceive this ubiquitous language learning environment as an opportunity for preparation, confirmation, and

<table>
<thead>
<tr>
<th>Proficiency Level</th>
<th>Place of Trial Use</th>
<th>Evaluation Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant 1</td>
<td>A2 Munich and surrounding area</td>
<td>28.07.-01.09.2010</td>
</tr>
<tr>
<td>Participant 2</td>
<td>A2 Munich and surrounding area</td>
<td>28.07.-01.09.2010</td>
</tr>
<tr>
<td>Participant 3</td>
<td>A2 Bonn and surrounding area</td>
<td>31.07.-28.08.2010</td>
</tr>
<tr>
<td>Participant 4</td>
<td>A2 Munich and surrounding area</td>
<td>31.07.-28.08.2010</td>
</tr>
</tbody>
</table>

Fig. 6. Learner Activity and Viewing Contents
general review. In addition, in the interview survey, we observed that learners experiencing the new learning environment reconsidered their learning behaviour; they displayed an attitude of reflecting these reconsiderations in their further language learning. The learners’ stance did not take an either-or form, that is, complete rejection of the former learning approach and complete adoption of the new approach, or the reverse; overall, we rather recognized a tendency to integrate the new learning approach into the set of learning methods the learners had used up to that time. Such changes in awareness seem to be associated with a change in attitude toward learning in a broad sense and not just toward language learning.

4. PROSPECTS FOR THE FUTURE

Issues to be addressed in our future research include the introduction of a function in which the learners themselves evaluate the compatibility of the distributed learning material with the place/situation. By reflecting that result, the system would automatically improve the compatibility of the teaching material distribution. Another possible feature could be an evaluation function that judges the learners’ understanding of learning contents, by semi-automatically evaluating texts that the learner has produced, such as SNS or blog texts. The current version of this system does not provide a method for automatically evaluating learner feedback on the distributed information. Neither does the current system have a function to evaluate systematically, whether the learner attained better performance results through using this learning environment. In this respect, we consider introducing a PDCA cycle of evaluating the learner’s autonomous learning, and then provide feedback to the learner. One future research direction, for example, could be the construction of this PDCA cycle by implementing a system of mutual assessment in collaborative learning between the learners connected through the community function and interactive communication between the learners and the material creators/teachers.

In this study, we found out that learners do rather not view the learning materials corresponding to their location immediately. However, they do tend to access the materials for preparation, confirmation, and general review. Thus, we currently consider the possibility of further developing the ubiquitous language learning environment to a learning support system for “reflection” of a whole day’s linguistic experiences and promoting output related to that. In particular, German language learners who participate in language classes at summer schools or who study abroad for six months to a year, often keep a journal in the form of a blog. (This is one of the conditions for learners of German at our campus for receiving credit points for their language class abroad). In such a system, the following learning support could be made possible: 1) learners will be able to use a GPS-function log of times, situations, and locations as a record of the day’s events; 2) a German vocabulary and expression list corresponding to the situations and places will be displayed; 3) the log as a record of the day’s events, will serve as a support to the learners, when they will write a blog entry in German, using the vocabulary/expression list. The latter approach is based on the “output hypothesis”: in foreign language learning, it is important to offer many opportunities for “output” instead of only for “input”; promoting learners’ awareness of what they can or cannot produce has been shown to be effective in language acquisition; furthermore, by using this system, learners can conceivably 4) increase their “own” vocabulary list along with their experiences in their everyday lives, and 5) write blog entries together with other learners by connecting on Facebook or Twitter, and thus improve their output in writing in a collaborative learning environment.

While the world surrounding our learners is changing every moment, in order to provide them with a learning environment that reflects these changes and is tailored to their needs, a long-term observation is necessary. Accordingly, this project will need to continue implementing and evaluating new approaches to experience-oriented learning support, and thus proceed with this research. For instance, if the rate structure of international roaming service becomes less expensive, this technology will likely be easier to use abroad. Bringing such developments into perspective, in addition to research supported by scientific funds, we are examining joint research and practical operation of a learning environment with a German publishing company.

NOTE

1) The notion of “language proficiency” is based on the “common reference level” of the Common European Framework of Reference for Languages (CEFR) established by the Council of Europe.
ADDENDUM

This paper is based on the research presented by Waragai et al. (2011), which has been expanded and is summarized here in that form.

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