CELL PHONE VS COMPUTER ACCESS FOR VOCABULARY STUDY:
A PRELIMINARY LOOK AT THE PREFERENCES OF JAPANESE STUDENTS

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ABSTRACT
This study examined the preferences of Japanese female university students when accessing e-learning materials to aid their study of technical vocabulary related to pharmaceutical sciences. A total of 275 first-year students were given 10-minute 10-item paper-based quizzes related to medical affix terms, such as electrocardiogram or gastrectomy. Over the week prior to the quiz, the students could access a Moodle site presenting the affixes used in words and in sentences similar to those that would appear on the quiz. Overall, the results indicate that the students had a favorable view of the e-learning materials which were introduced for the first time this academic year.

INTRODUCTION
Modern technologies such as the Internet present new opportunities for teaching and learning at all educational levels and many universities today are striving to integrate appropriate technologies into campus classroom, but little is known about the actual implementation process, as pointed out by Brill and Galloway (2007). They examined how college-level instructors use classroom-based teaching technologies and their attitudes towards these technologies using surveys and interviews. They reported a positive influence of technology on teaching and learning.

A wide range of teaching and learning materials are now available for e-learning, but Reinders (2007) pointed out such materials are often not suitable for self-access. Also, there is frequently no clear link between student learning in a self-access center (Reinders and Lewis, 2005, 2006) and their actual language use outside the center (Cotterall and Reinders, 2001). To better promote actual language use, the teaching/learning practices of English for
specific purposes (ESP) were applied to the materials development for this study. ESP aims at promoting the teaching and learning of language patterns and communication practices that can be actually applied in professional or vocational situations by those studying the language. For the present courses, the English instructors had consulted professionals in pharmaceutical science about the projected language needs of the students. As they are likely to become pharmacists or those working in related fields, the learning of medical terms was identified as a very important learning target. Thus, paper quizzes of the Latin and Greek affixes used in medical terms had been administered to the students as one of the components of the ESP course.

The significance of teaching medical affix terms to these students is supported from the cognitive-psychological standpoint. Corrigan (2007) states that the kind of information about words that is represented in memory and how that information is used is important when making word choices. For deep vocabulary knowledge, Meara and Wolter (2004) showed that knowledge of lexical organization is critical because words that have more complicated sets of connections to other words "will tend to be more deeply known than words which are linked more tenuously to other words". Wolter (2001) examined non-native speakers' responses on a word association measure in relationship to their depth of vocabulary knowledge. He found that L2 speakers tended to give more phonological associates for lesser-known words, but that they produced more semantic associates as they acquired greater understanding of individual word. Such findings offer support for the quizzes developed for this course. Ten medical terms are presented with ten sentences that can be completed using a form (declension changes) that would match the sentence semantically. Each sentence that includes some hint as to the word that would best suit the sentence, often presenting other terms having the same or a close meaning. For example, in the sentence "After examining the electrocardiogram, the family doctor sent the patient to see a heart specialist," the target word is "electrocardiogram," which includes "cardio" for "heart" and "gram" which is often found in words related to the recording of data.

The students had been studying with paper materials but the use of computer-based technology is being planned with the aim of adding an interactive game-type effect to raise interest in the study of technical vocabulary and also to eventually add listening/speaking components. The pronunciation of technical vocabulary is often difficult to master as the words do not usually appear in general dictionaries. As the initial step in this direction, this pilot study examined the preferences of Japanese female university students in pharmaceutical sciences when accessing e-learning materials to aid their study of technical vocabulary related to their major. Since this study was a pilot one for a larger project aimed at moving paper materials to an online language study environment, we wanted to identify the issues involved, related to hardware and software as well as the reactions of the instructors and the students to the process. Our focus this time was on the student reactions but this study will also examine issues related to how to integrate an appropriate technology into college classrooms using ESP approaches.

**METHOD**

A total of 275 first-year students were given 10-minute 10-item paper-based quizzes related to medical affix terms, such as *electrocardiogram* or *gastrectomy*, at the beginning of each 90-minute class that met once a week for 13 to 15 weeks per semester. (For the Affix Quiz, see Appendix 1). The e-learning materials were introduced to the students for the first time in the
second semester. (For an example of paper materials, see Appendix 2). They could access a Moodle site via computer or cellphone to study for the quiz over the week prior to its administration.

During eight weeks in the second semester of the academic year 2007 (the semester ran from September to December), we examined the preferences of these students with respect to paper and e-learning materials. At the beginning of the semester, the students were assigned to groups who would use computer, cellphone or paper materials to study for the affix quizzes. The students were categorized into the following five groups: (1) 76 students used the cellphone for the first 4 weeks of the study and then used the computer for the remaining 4 weeks; (2) 69 students used only the computer; (3) 65 students used the computer then the cellphone for 4 weeks each; (4) 29 students used only the cellphone; and (5) 36 students used only the paper materials. At the beginning of the project, 239 students chose to have opportunities to experience the e-learning materials whereas 36 students chose to use only the paper materials.

Those who chose using the computer or cellphone modes were encouraged to access a website on Moodle as many times as they wished. The website named “Affixes for Pharmacology” presented affixes which were related to the pharmaceutical sciences and were used in words and in sentences similar to those that would appear on the weekly 10-minute 10-item paper-based quizzes. After taking the quiz, at the beginning of a class, the students exchanged quiz papers for checking. Groups volunteered to select a sentence to read aloud with what they considered to be the best-choice word to complete each sentence. Another group was asked to check whether or not the choice was acceptable and to explain the choice. Phonological practice was given by having the words read out together and then the sentences recited together after the best word had been chosen.

The Moodle site had ten units of two sections each: An explanatory section with 10 sentences using new affixes; and matching quizzes for reviewing the new affixes. Whenever a student accessed a matching quiz on the site, a quiz was randomly generated from the study items. (For a screenshot of the Moodle site, see Appendices 3-5).

We then checked their access records and asked the students to respond to a names-on questionnaire at the term end. The questionnaire included 43 questions about the access frequency, the time used for e-learning, the students’ learning preferences, their study environment and their IT skills. Almost all of the questions had three choices while some had four. The students were also asked to freely give comments on the e-learning materials.

RESULTS AND DISCUSSION
According to the students’ access records, there were only about 550 accesses by 100 learners out of the total of 239 students during the 8-week research period. The quizzes were only accessed once or twice by 44% of the students. This number of accesses was considerably less than what we had expected. The number of accesses and questionnaire results indicate that the students mainly used the paper materials.

Despite this low access record, the students’ comments on the e-learning materials were favorable. In fact, more than 70% of the students responded that they want to use both e-learning and paper materials. In addition, 30% of the learners studied for a longer time than they had prior to this introduction of e-learning.

Other questionnaire results showed that: the students’ preference for cellphone vs computer for e-learning was almost fifty-fifty but slightly more
accesses were from cellphones than computers; about two-thirds of the students reported that they were familiar with cellphone operation but many had difficulty with English typing on computers. Some found it a bother to start up the computer and log in; more than 50% of the students do not normally spend much time on the Internet or chatting and exchanging emails with friends. The students studied alone, not with friend(s), mainly on weekends and the day prior to the weekly affix quiz and just before the semester-end exam; 50% of the students studied at home and the other half did their studying elsewhere. The students are likely not to be at home when accessing the site via cellphone probably because over 50% of the students take one hour or more to commute to and from the university. They commented that they want to use their long commuting time for class preparation such as studying for the English affix quizzes.

The circumstances outlined above are possible reasons why the students accessed the Moodle site less than we had expected. Although they were interested in the e-learning materials and wanted to use them more, this was the first time for the students to use e-learning materials after having been given only paper-based instructions with no hands-on orientation. They thus did not seem to know when, where and how they should utilize the e-learning materials.

One major finding among the 234 voluntary comments, came from 148 students who stated that they were unfamiliar with the use of IT tools despite the widespread use of computers and mobile phones in the Japanese society today. More than one-fifth of the students who gave comments stated that they did not possess sufficient computer skills or the ability to access the Internet via mobiles and almost one-tenth considered it bothersome to start up the computer and to log in.

On the other hand, 89 comments indicated a clear preference for e-learning tools over paper materials and another 23 expressed a positive attitude towards future use of e-learning. Some students indicated their preference of the cellphone due to its accessibility and flexibility whereas others preferred the computer for its larger screen and quick access. Some interesting comments showed the student’s preference for paper materials even when a computer was available. That is to say, some preferred to use the computer simply to print out the e-learning materials from the Moodle computer version for later study, something which they could not do from the cellphone site. This is most likely because the students have been accustomed to studying with paper materials since elementary school. Changing habits is not easy, so while many students express interest in e-learning, more than 70% actually want to use both e-learning and paper materials. If the students have more opportunities to use IT tools, we believe that they will gradually show a more clear-cut preference for e-learning.

Those who expressed interest in the e-learning materials, asked for improvements in the materials themselves and easier access to them. They wanted a link within the university’s website for instant access; accessibility via all available methods (which means that the students want to be able to use all study modes as desired); listening materials; more examples to study; more frequent updates; and other types of quizzes related to vocabulary learning.

Some students pointed out a few problems with respect to the use of the cellphone. These included phone expenses borne by the students and frustrating access problems with long waits. While using the cellphone to learn medical affixes is one of the best ways to utilize niche time for study, considerable care is needed as phone expenses are borne by the students.
As the next step, we plan to compare the use of paper and cellphone materials because the cellphone has gained a place in today's society and using it for learning seems to fulfill the students’ needs for flexible and accessible learning materials. We plan to place more emphasis on developing e-learning materials for use on cellphones.

CONCLUSION
The overall conclusion was that the students welcomed e-learning materials and 30% of the students had spent more time studying for these affix quizzes than they had before the introduction of the e-learning materials. The students’ preference for computer and cellphone access was about the same with slightly more accesses from cellphones. Yet more than 70% wanted to use both e-learning and paper materials. This is found to be in good agreement with the data that many students gave unfamiliarity with the use of such IT tools as a reason for not using the tools despite the widespread use of computers and cellphones in our society. Based on the research results, one challenge is how to familiarize students with computer use while another is how to encourage more “niche learning” via cellphone. Niche learning would appear to be a fruitful approach to study for students with a heavy course burden in fields such as pharmaceutical sciences, and would allow them to use their long commuting time for effective learning.

REFERENCES


Appendix 1

Affix Quiz 1A07 103
Complete each sentence with the correct form of the most suitable word from the list below.

colostomy  craniotomy  dehydrate  disequilibrium
coronary    cytohistology  dentifrice  dysfunction
coronary    cytohistology  dentifrice  dysfunction

1. If you do sports activities without taking fluids, you can become _____.
2. An _____ is an egg before the maturation stage.
3. _____ artery disease can eventually weaken the heart muscle.
4. In _____, an artificial anal opening is surgically formed from the colon.
5. A _____ had to be performed on the man who injured his head in the accident.
6. _____ means that there is a loss of balance.
7. The _____ contains an abrasive to remove plaque from teeth.
8. The study of the cells and tissues is called _____.
9. Issac Newton was a _____ of Johann Sebastian Bach.
10. Her father's kidney _____ is a complication of his diabetes.

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<tr>
<td>Group No.</td>
<td>Date</td>
<td>Checker Signature</td>
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Appendix 2

bi  two, twice, double, 二, 双, 両
bio  life, 生命, 生物, 生活, 生体
brachi  上腕
bronchi  気管支
buccal  ほお（頬）
carcino  癌
cardio  心臓

In biology, bilateral (両側) refers to both the right and left sides of the organism. The biopsy (生検) of the liver showed that the patient had a cancerous tumor. Insert the catheter into the brachial (上腕) vein. Asthma patients sometimes use bronchodilator (気管支拡張薬) inhalors. A buccal (ほお) gland (頬腺きょうせん) is a mucous gland located in the membrane lining of the cheeks of mammals. Tests of the new food preservative showed that it could be carcinogenic (発がん性の), causing cancer of the liver. Cardiopathy (心臓病) refers to a diseased condition of the heart.

Appendix 3

Mukogawa English Mobile Moodle

アカウントをお持ちの方ですか？
ユーザー名
パスワード
いつもこのコース帛教材で利用できます。

はじめての方ですか？
こんにちは！コースにアクセスするために新しいアカウントを作成してください。アカウント作成方法は以下のとおりです。

1. アカウントの作成
   - 新しいアカウントを作成する必要事項を入力してください。
2. アカウントの登録
   - 入力した情報がメールに送信され、アカウントの設定が完了しました。
   - メールを開いて、アカウントの利用を確認してください。

3. コースへのアクセス
   - コースにアクセスするには、メールで接收されたログイン情報を利用してください。
   - メールで受信されたログイン情報を利用した場合に、アカウントの設定が完了しました。
   - ログイン画面を開いて、アカウントの設定が完了しました。
Appendix 4

### Affixes for Pharmacology

<table>
<thead>
<tr>
<th>Affix</th>
<th>Example</th>
<th>Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>buccal</td>
<td>A buccal gland is a mucous gland located in the cheeks of mammals.</td>
<td>Oral cavity gland</td>
</tr>
<tr>
<td>mammography</td>
<td>Breast tumors can be detected by mammography.</td>
<td>Breast imaging</td>
</tr>
<tr>
<td>brachial</td>
<td>Insert the catheter into the brachial vein.</td>
<td>Arm vein</td>
</tr>
<tr>
<td>pedi</td>
<td>My father uses a pedometer to check how much exercise he gets during his walks.</td>
<td>Step counter</td>
</tr>
<tr>
<td>nasopharyngeal</td>
<td>Nasal sprays are used to treat a stuffed or runny nose.</td>
<td>Nasal passage</td>
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</tbody>
</table>

Appendix 5

### Affixes for Pharmacology

<table>
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<th>Affix</th>
<th>Example</th>
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<td>brachi</td>
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**Unit 1A - Unit 1A**

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