

A blended EFL reading course based on the idea of the learner-annotated corpus

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Abstract: This study aims to explore the usefulness of a blended EFL reading course based on a new idea for the corpus designing technology. First the authors give a brief sketch of the idea of the ‘learner-annotated’ corpus. The new type of learner corpus was created using an e-learning system named iBELLEs, which was used in the undergraduate EFL reading classes in Tohoku University. The next sections will address the objectives of the study in two individual phases, i.e., the quantitative analysis of the learners’ achievements at the end of the course and the qualitative analysis of four individual cases of the learners’ annotations. The learners’ scores in the first phase were used to select the representative cases of the second phase that tries to observe learners’ actual reading processes through their annotating behaviour.

Keywords: EFL reading practice, e-learning system, learner-annotated corpus, blended language teaching, markup convention

1. Introduction

The present study, which is part of a larger project, tries to report the findings of a case of a blended EFL reading course based on the idea of a learner-annotated corpus, annotated not by the researchers, but by the learners themselves. First the authors give a brief sketch of the idea of the ‘learner-annotated’ (not annotated learner) corpus. The learner-annotated corpus data of the present study was created and collected using a new e-learning system named iBELLEs (interactive blended English language learning enhancement system). The system was used in the face-to-face general English reading classes in one of the top-ranked Japanese national universities. The following sections will address the objectives of the study in two individual phases: (1) a quantitative analysis of the learners’ achievements at the end of the course; (2) a qualitative analysis of four individual cases of the learners’ annotations. The learners’ scores in the first phase were used to select the representative cases of the second phase with the aim of reflecting learners’ actual reading process through their real-time annotating behaviour.

2. Learner-annotated corpus

2.1 Learner corpus and corpus annotations

The term ‘learner corpus’ appeared in the mid-1990’s and has become more and more used frequently during this century, as a search using Google Books Ngram viewer might confirm.

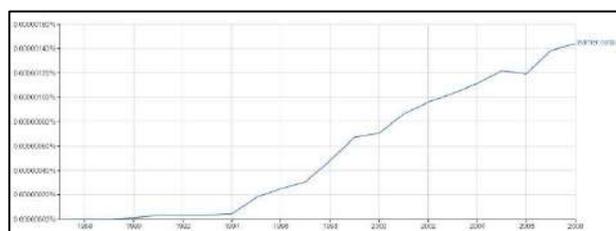


Figure 1. The result of Google Books Ngram Viewer

Such learner corpora, consisting of written and spoken data produced by the learners of a second language, may be annotated by the researchers with ‘error tags’ indicating where the learner has made errors, and what kinds of errors these are (Leech 2005). In other words, the learner corpus is a sort of specialised corpus of learner-produced texts with annotations made by researchers or language teachers.

Leech (2005) cites six types of annotations to corpora:

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phonetic annotation, semantic annotation, pragmatic annotation, discourse annotation, stylistic annotation and lexical annotation. The noticeable point here is that these six types of annotations are given to the corpus by researchers or teachers. The current study tries to add to this list a new, seventh type of annotation, i.e., pedagogical annotation. However, the pedagogical annotation in our framework is not provided by the researchers or teachers, but by EFL learners, reflecting their on-going reading processes. We may call it a 'learner-annotated' corpus.

2.2 Learner annotations

Recently the so-called learner corpus-informed (driven) research has led to a variety of pedagogical applications such as grammar books, learner dictionary editing, writing aids (automatic assessment, annotation or rating), and teacher training (Meunier, 2016). However, here we need to pay attention to the question that of why a learner corpus consists exclusively of texts produced by learners, i.e. learners' outputs. This is probably due to the following reasons: (1) though the main goal of SLA research is to uncover the principles that govern the process of learning a second language, this process has to be accessed via the product, i.e., learner performance data, since the process is mental and therefore not directly observable; and (2) current SLA research is mainly based on introspective data and language use of the elicited type (Granger, 1998). The elicited language data is typically the result of a controlled experiment in order to collect very rare, infrequent linguistic properties and to reveal the entire linguistic repertoire of the learners. Then, what is introspective data? It consists of (1) data of mental judgements to tap learners' intuitions about the target language, and (2) self-report data to explore learners' strategies via questionnaires or think-aloud tasks.

This study tries to explore the EFL learners' reading process, which is much more unobservable than learner-

produced texts as a result of controlled compositions. Let us give an examination to the 'self-report data', especially in the area of reading comprehension practice. The self-report data should be made during the intervention phase when each participant is given time to record his/her reading strategies and reflections. All participants are asked to write down their reflections on the mediation in order to record their reading process and use of reading strategies. And the participants are encouraged to do so during, not after the mediation session (Teo & Jen, 2012). However, there arises a question if the self-report data is genuinely made 'during actual reading'. Therefore, this study does not rely on the learners' metacognitive introspection on their reading activity, and instead tries to make a direct observation of the EFL learners' reading process, i.e., to monitor their on-going reading performance by developing a new e-learning system and a new pedagogical markup convention.

3. Method

The present study was conducted using a combination of quantitative (pre-test / post-test) and qualitative (typical case sampling) methods. The first phase of the study presents the analysis of the effects of the implemented system (iBELLEs) on the learners' final progress, and the second phase reports the highlighting behaviour of four representative cases.

3.1 Participants

The participants in the study were 276 Japanese EFL undergraduate students attending general English classes. The students were studying engineering (N=43), law (N=100) and science (N=133). Their age ranged between 18 and 21, and the majority of them were freshmen. All the participants signed an informed consent form that explained the aim and procedure of the study at the beginning of the semester.

3.2 Research context and the basic idea of annotations

3.2.1 General EFL courses

The context of the present research is CALL classrooms in which over four hundred desktop PCs are connected to the dedicated network and to the Internet via one of the fastest network systems in Japanese educational institutes. Each student logs into the network using their own student ID, and all the learning activities are supported by a robust learning management system (LMS) called WebOCMnext developed by Cybermedia Center at Osaka University.

The new e-learning system, iBELLEs is accessed through WebOCMNext. Basically, iBELLEs runs in two distinct modes, i.e., teacher's and student's modes. The LMS also provides useful links to the external resources on the Internet such as online dictionaries or thesauri. Inside the CALL classrooms there is a monitor installed for materials presentation in between two student PC's for the material presentation on which the students receive visual instructions and feedback from their teacher.

Each general English class is 90 minutes long; the freshmen have two classes, and the sophomores have one class per week. The course is compulsory for all the students in Tohoku University where this experiment was conducted. It should be noted that the general EFL classes for undergraduates are not organised according to the students' English language proficiency, though the students passed a series of highly competitive entrance examinations.

3.2.2 Highlighting and how it works

In the actual reading process, whether it is in an EFL learning context or not, readers frequently make annotations or annotate their texts in order to enhance understanding and interpretation of their texts. The term 'annotation', especially in the study of the reading process, can be defined as readers' active engagement in contributing additional information to help their reading; it includes underlining, highlighting or making short notes

in the margin. The present study concentrates on the highlighting choices of Japanese EFL learners in the face-to-face reading instruction classes using iBELLEs.

As pointed out in a study comparing paper-based and online annotations (Kawase, Herder, & Nejd, 2009), in the online learning environment, annotation tasks sometimes impose an additional cognitive burden. The learners have to use keyboard and mouse when they try to make short notes on the electronic reading materials, which will consequently impede the flow of the natural reading process. Kawase et al. (2009) states that there is a difference between the paper-based and online annotations, and that the online annotations they observed were typically short and had a certain purpose such as to find particular areas of a text. As reported in Lu and Deng (2013), highlighting is most frequently used among the online annotation tools to monitor the learners' actual reading process. Thus, on iBELLEs, learners just use only a mouse to add information to their target reading materials, thereby limiting the interruptions to the reading process. In other words, iBELLEs, which is specifically designed for the in-class, face-to-face environment, was developed to observe learner's reading process and minimizing the cognitive burden imposed upon them.

The learners are prompted to highlight particular parts of the target reading material following the teacher's instruction, such as using the red highlighting to indicate their unknown words, or the blue highlight for their partially-known words, as illustrated in Figure 2. We define the term 'unknown word' and 'partially-known word' as follows: an unknown word is a lexical item that is completely new to the learner, in other words, the learner has never encountered the word in question before; on the other hand, a partially-known word is a word of which meaning is not fully familiar to the learner, that is to say, the learner is not quite sure of its meaning even though he/she believes to have ever seen the particular word. The instructions for the highlighting tasks are

presented on the in-between students' monitors.

One of the authors has a long experience in designing corpora, especially the additional attributions given to them, including POS, prosodic, semantic tags and so on. The originality of the current study is that the learners' reading process is reflected as 'learners' self-annotated corpus', and emerges itself as an observable data. In the actual classroom sessions, the teacher can define the meaning of the highlighting colours. Though in the present study, the red highlight is defined to signal students' 'unknown word', and blue to signal 'partially-known words', these colours can be used in different sense, e.g., red for 'key word'; blue for 'discourse marker'; and yellow for 'topic sentence'. Some of our colleagues actually use the yellow highlight to signal topic sentence or particular spots of a passage that should be paid attention. What should be noted is that the highlight colours can be flexibly designed by each EFL teacher, with pedagogical purposes, to observe the students' reading process, and that the highlight-colour definition scheme (principle) should be exchanged in the community of the EFL teachers who are working on the common teaching materials.

The annotation in this study is built on the XML database system, because it is always possible to extend the XML vocabulary that one uses to support the specific requirements for a particular corpus development project (Hardie 2014). Thus, the pedagogical annotation is not ad hoc, since it complies with certain fundamental rules of XML such as tagset, the use of attributive value, and so on. The pedagogical tagset can be designed collaboratively by EFL teachers working on common teaching materials, and the attributive value to visualise the learners' actual reading processes, is realised as 'highlighting' of particular parts of the target passage with distinctive colours.

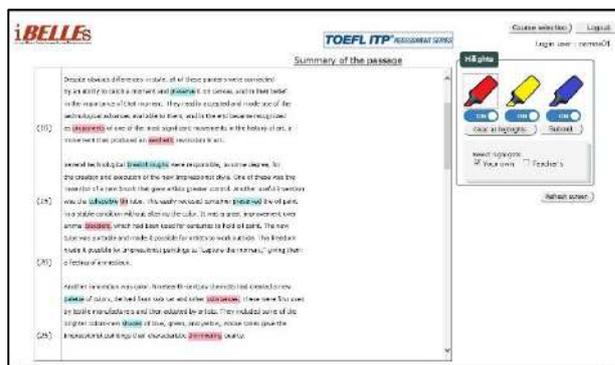


Figure 2. The student mode screen of iBELLES

As represented in Figure 2, the students were asked to highlight particular parts of a given target passage, authentic material from the *TOEFL ITP®* Assessment series, following the teacher's instructions on the highlight colours. The EFL teachers can define the attribution for different pedagogical purposes, for example in order to observe particular vocabulary on which their students might stumble, or their understanding of the paragraph structure. The highlighting functionality of iBELLES is built on a corpus management system that allows a flexible attributive tag design (Okada 2014), which makes the highlighting as one of the pedagogically significant annotations, especially those given by the learners.

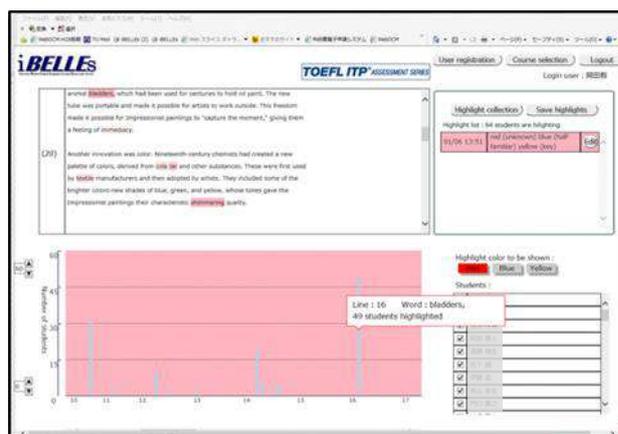


Figure 3. The teacher mode screen of iBELLES

Figure 3 shows the iBELLES screen showing the teacher's real-time access to the students' highlighting.

The denser coloured spots indicate the convergence of the students' highlighting, meaning many students highlighted that specific spots. The bar graph underneath the text window shows the exact number of the students who highlighted a given spot.

One of the merits for an EFL teacher using iBELLEs is that he/she is allowed to modify or alter the pre-designed teaching plan dynamically (Okada & Sakamoto, 2015). For example, since the teacher can observe his/her students' reading process simultaneously, he/she can notice the parts of the target passage which he/she needs to explain more, or select items to improve the students' understanding of the paragraph structure as illustrated in Figure 4.

The mechanism of the dynamic selection or altering of the teaching plan illustrated in Figure 4 is described as follows. The leftmost rectangle shows an original teaching plan designed by the EFL teacher prior to the class. In the face-to-face classroom session the teacher prompts the students to highlight particular parts of the target passage after highlighting instructions. The teacher is able to observe the students' highlighting results on a real-time basis as shown in Figure 3.

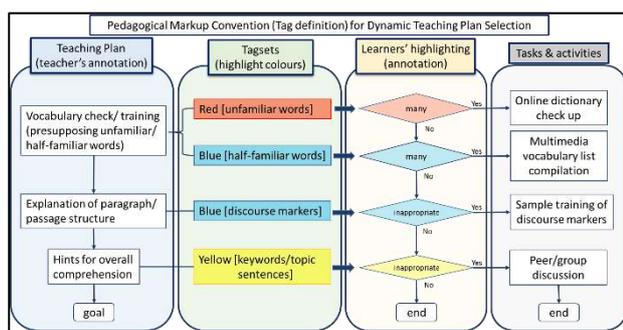


Figure 4. The dynamic teaching plan based on the highlighting tendency

When the teacher visually recognises that there are many words in dense red, it suggests that the passage contains many 'unknown' words for many students in the class. In such a case, as the rightmost rectangular shows, the

teacher will spend more time for teaching vocabulary and may encourage the students to use outer web resources such as online dictionaries. When the dense blue parts are prominent, the students are prompted to engage in vocabulary learning tasks themselves, in a wider context, for example by visiting appropriate web pages in which their 'partially-known' words are used. On the other hand, when the teacher recognises that the students have few difficulties with the vocabulary, he/she will spend more time in a given period on the paragraph structure by asking the students to find and highlight discourse markers, keywords or topic sentences in the target passage. The teacher may even prompt the students to have peer or group discussions to reach a deeper comprehension. This flexible design of the teaching plan is realised by the real-time observation of the students' reading behaviour through iBELLEs. Based on the highlighting records collected and stored by iBELLEs, the teacher can design better teaching plans for the coming classes. This means the improvement of EFL reading instruction is achieved sequentially, based not on the individual teacher's experience or intuition, but on an objective observation of the students' reading performance observed only with iBELLEs.

3.3 Data collection and analysis

3.3.1 Phase 1

The data for this phase of the study was collected using two sets of reading section tests, each consisting of five passages with 50 questions. They are extracted from the genuine TOEFL ITP® Assessment series, under the copyright license agreement between ETS® and Okada, at the beginning (pre-test) and at the end of the semester (post-test). The semester is usually for 16 weeks. Since the analysis of the students' achievements was the major objective of this phase, the students' gain scores were also calculated. The outliers were detected using box plot analysis and nine students were excluded from the rest of

the analysis (N=267). After confirming the normality of score distribution in the pre-test and post-test, a paired samples t-test was conducted to compare the means of the students' pre-test and post-test scores, and to investigate if there was a significant difference between the students' scores at the end of the semester. After the analysis of the effectiveness of iBELLEs on the students' achievements (gain scores) at the end of the semester, a Pearson Correlation analysis was conducted to identify the relationship between the students' gain scores and their *TOEFL ITP*® test scores (both the overall scores and their scores in each individual section: listening, structure, and reading). All the students are required to take *TOEFL ITP*® test at the end of the semester.

3.3.2 Phase 2

We divided the students into two groups: high-achievers and low-achievers respectively by their gain scores. One representative student was chosen from each group for the qualitative analysis, i.e., an observation of their actual highlighting behaviour. By using a typical sampling technique as illustrated in Figure 5, two students were selected on the criteria of their pre-test scores and gain scores: their pre-test scores were close to the class average; and their gain scores were close to the average of each group. We call them student A, and student B respectively.

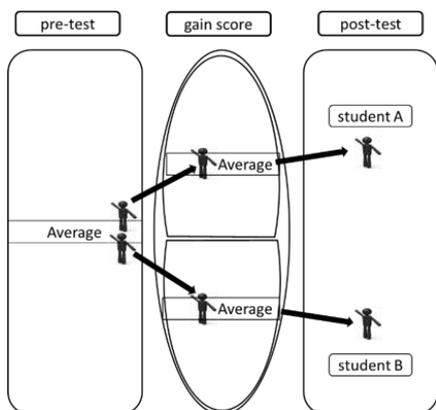


Figure 5. The two representative students selected by a typical case sampling technique

In addition, another two sample students were selected on a different criteria: the students whose pre-test scores were close to the overall class average; and whose gain scores were very high and very low (close to the outliers) as illustrated in Figure 6.

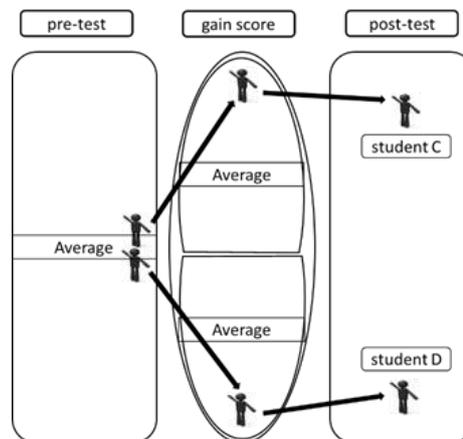


Figure 6. The two representative students selected on different criteria

4. Results

4.1 Phase 1

Table 1. The descriptive statistics of pre-test and post test scores

	N	Min	Max	Mean	Std. DEV
Pre-test	267	30	92	62.59	12.51
Post-test	267	44	96	68.69	10.71
Gain score	267	-16	30	6.10	9.4

The descriptive statistics of the scores in Table 1 indicate a difference between the means of pre-test (M=62.59) and post-test (M=68.69) scores of the students. Table 2 shows if this difference was statistically significant.

Table 2. Paired samples t-test of the pre-test and post-test scores

		Paired Differences				t	fd	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the				
					Lower				Upper
Pair 1	Pretest - Posttest	-6.09	9.4	.576	-7.23	-4.96	-10.59	266	.000

The results of the paired samples t-test revealed a

statistically significant difference between the students' performance on the pre-test and post-test [$t(266) = -10.59$, $P < .001$].

Table 3. Pearson correlations between gain scores and TOEFL scores

		TOEFL ITP®	TOEFL Listening	TOEFL Structure	TOEFL Reading
Gain score	Pearson Correlation	-.178**	-.129*	-.143*	-.165**
	Sig. (2-tailed)	.003	.032	.018	.006
	N	276	276	276	276

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

As indicated in Table 3, the results of the Pearson Correlation identified a negative weak relationship between the learners' gain scores and the three sections and overall *TOEFL ITP®* test scores. *TOEFL ITP®* test overall score ($r = -.178$, $p < .01$); *TOEFL ITP®* test listening ($r = -.129$, $p < .05$); *TOEFL ITP®* test structure ($r = -.143$, $p < .05$); *TOEFL ITP®* test reading ($r = -.165$, $p < .01$). The negative correlations suggest that the lower the learners' achievements at the end of the term, the higher their scores on a *TOEFL ITP®* test.

4.2 Phase 2

To the five material passages, with 1,521 running words (960 content words), from *TOEFL ITP®* Assessment series, student A and B gave their own annotations, i.e., highlights to their unknown words and partially-known words (Table 4). Each word in the passage is given a difficulty level number specifically designed for the Japanese EFL learners, ranging from 1 through 14. Level 1 stands for the basic 1,000 words that are taught in junior high school, and each number indicates the difference of the difficulty, i.e., the higher the value, the greater difficulty it represents for the Japanese learners. The participants in this study were expected to have been taught at least 4,000 words in their junior and senior high school EFL classes. Table 5 demonstrates the highlighting results of student C and student D.

Table 4. Two students selected by typical case sampling technique

			Unknown words	Partially-known words	Total out of 960 words
High achiever	Student A	N of words	31	13	44
		word level Avg	9.46	8.06	
		word level SD	2.84	1.16	
Low achiever	Student B	N of words	23	26	49
		word level Avg	9.18	7.5	
		word level SD	3.73	3.57	

Avg=Average, SD=Standard deviation, word level = (1-14)

Table 5. Two students selected by the criterion: (1) close to Pre-test average; (2) close to outliers of gain

			Unknown words	Partially-known words	Total out of 960 words
High achiever	Student C	N of words	25	23	48
		word level Avg	7.96	6.36	
		word level SD	2.5	3.15	
Low achiever	Student D	N of words	25	18	43
		word level Avg	7.74	7.96	
		word level SD	2.82	3.66	

Avg=Average, SD=Standard deviation, word level = (1-14)

5. Discussion and conclusion

This study is a part of a project aimed at improving the Japanese EFL students' reading proficiency. The project implements an interactive blended English language learning enhancement system (iBELLEs) to facilitate the actual teaching in the reading comprehension courses, and this study, specifically aimed at reporting the findings from one of the courses. As the results indicates, the students' reading proficiency had improved significantly at the end of the term; this might be due to the effectiveness of the implemented system. As mentioned earlier, iBELLEs is designed to facilitate reading proficiency by encouraging the learners to engage actively with the texts through highlighting tasks. The prominent feature of the system is the simultaneous transfer of the students' highlights to the teacher's screen, which in the actual classrooms could provide the teacher with a prompt

and clear understanding of the students' behaviour and needs. This understanding of the students' needs and difficulties with specific spots in a given passage could successfully help the teacher in harmonizing the classroom instructions according to needs identified and consequently, leads to the improvement of the teaching plan and the students' better learning and significant progress.

Since the ultimate goal of the main project is to enhance the students' performance on the real *TOEFL ITP*[®] test, the relationship between the students' progress at the end of the term and their real *TOEFL ITP*[®] test scores is of significant importance. The findings of the correlation table revealed that, contrary to our expectations, the low-achiever students benefitted more from the entire reading course and the implemented system, although not with a high degree of coefficient. We believe that one of the main reasons for this is the diversity of the students' language proficiency level, as well as the heterogeneity of the classes, which sometimes resulted in the lack of learning motivation that is generally observed in the low-achiever group.

Table 4 shows that the ranges of word difficulty level of unknown words and partially-known words highlighted by student A, who represents a typical case of the high-achiever group, was narrower than that of student B, who is a representative of the low-achievers. This would suggest that the high-achievers have a set of difficult vocabulary with a relatively fixed range, whereas the low-achievers tend to have difficulty, especially on his partially-known words, with wider word levels. This is supported by the fact that student A choose *cargo* (=level 6), *vent* (=8), *reservoir* (=9), *trolley* (=9) or *duct* (=11) as his unfamiliar words, while student B highlighted *press* (=level 2), *draw* (=level 3), *ethics* (=5) or *accumulation* (=8) or *capillary* (=13).

Table 5, on the contrary, does not show any sharp contrast between the two representatives from high and

low-achiever groups. A weak tendency of highlighting words with high difficulty level words, such as *fabrics* (=7), *imprinted* (=8), *phonograph* (=10), *locale* (=13), or *collapsible* (=14) as partially-known words for the representative student from the low-achiever group were observed.

As stated in section 2, iBELLEs is specifically designed for in-class, face-to-face use. Therefore, unlike other studies such as Lu and Deng (2013), which investigated the effective use of sticky notes as well as highlighting in the out-of-class learning environments, iBELLEs puts a greater stress on monitoring the natural flow of the learners' reading performance inside the classroom. Particularly important is the fact that the highlighting on the iBELLEs screen is not provided in an *ad hoc* way, but is given under teacher-defined pedagogical attribution, such as unknown vocabulary, keywords or topic sentences. The attributive value of the highlighting is determined by the EFL teacher; whereas the actual highlighting are given to distinct parts of the target reading material by the learners. This is the reason the data compiled through iBELLEs in the face-to-face classes can be called a 'learner-annotated' corpus.

As illustrated in Figure 4, the real-time information that reflects the learners' reading activity is an eligible source for the selection of flexible teaching plans. After the classroom session, each EFL teacher may use the learner-annotated corpus to improve subsequent classes, and the group of EFL teachers can organise a community working on common teaching materials, and encourage each member to exchange pedagogical ideas that should be reflected in the highlighting definitions. Through the iBELLEs database in which learner-annotated corpora are stored systematically, the EFL teacher community can work together and collect abundant practical examples of actual classroom practice where the initial teaching plan was dynamically changed by the real-time observation of the learners' reading process.

The current study came with some limitations. First, the major limitation of the study which was the absence of the control group may prevent us from attributing the students' actual progress merely to the implemented system and the project would go further with an in-depth investigation of the students' viewpoints about the effectiveness of the system, tasks and the teacher instructions on their reading proficiency. Next, as stated in section 3.2.1, there were also four factors that made the research difficult: (1) there were not enough number of EFL classes per week, especially for sophomores who had only one class; (2) none of the participants were majoring in English; (3) the general EFL course was compulsory; and (4) there was a wide range of English language proficiency difference between the students. Although the university itself tries to help the undergraduate students acquire world-class EFL proficiency, heterogeneity in the classroom sometimes leads to a lack in student motivation. Even though the great majority of the participants provided informed consent, and participated willingly in the experiment, some students' only concern was to get a higher grade in the compulsory course rather than providing the traces of their reading process, therefore, the data obtained in such studies may sometimes include some unpredictable outliers. Finally, we have examined four representative students' highlighting performances from which we tried to elicit some qualitative properties. However, as shown in Table 4 and 5, we could only observe the slight inclinational difference among the students' highlights. Consequently, if it is not possible to minimise the heterogeneity of the classes, we need a greater number of sample students in order to investigate the correlation between their highlighting behaviour and enhancement of the reading comprehension skill.

Though the pedagogical annotation seems to have unlimited potential, further studies need to try to answer the question whether this might provide one of the 'provisional *de facto* standards' of good practice for

different levels of linguistic annotation (Leech, 2005).

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