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Development and Evaluation of the Interactive English Language Literacy System (i-ELLS) for online reading comprehension

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ABSTRACT

i-ELLS (interactive English Language Literacy System) is a prototype that is developed based on empirical evidence of online literacy processes and reading strategies used by multilingual Malaysian readers reading for academic purposes. Based on these findings, several technological features such as discussion tools, real-time audio-visual chat, personal knowledge construction and annotation tools were developed for the prototype in order for the system to cater to the reading strategies identified. The i-ELLS prototype presents a novel way for readers to interact with online textual materials that can be personalized and interacted with in order to assist with literacy and comprehension. It is also designed for collaborative activities in order to maximize the benefits of online environments. It is currently being used in a postgraduate teaching and learning context at Universiti Kebangsaan Malaysia. This paper reports on the development as well as the students' overall evaluation on the use of the system. The feedback on the use of i-ELLS revealed positive and negative responses. These findings are important as they provide valuable insights on how students read online as well as the technology needed to support an online academic reading environment.

Keywords: online literacy system; interaction; reading strategies; online reading tools; CALL

RESEARCH BACKGROUND

Reading researchers and educators have claimed that computers and the internet are changing the way people read. The emergence of this new technology has redefined the definition of literacy and thus would need to be viewed as a central aspect of literacy research. This phenomenon is most visible nowadays when learners tend to rely on computer-based resources, such as reading online, writing emails and blogs rather than paper-based resources. With the expansion of these new technologies, learners are able to build their knowledge base and develop literacy skills (Kasper, 2003). The use of digital texts and internet technologies enable the learners to enhance and improve their learning beyond the physical classrooms. Thus, when technology is integrated within the curriculum, it provides the learners with the motivation to develop the skills needed to engage themselves in the information age. Furthermore, accessibility to these online reading opportunities serves as a useful supplement for learners to efficiently process and comprehend many difficult texts. However, this union of reading and technology has raised some concerns among researchers and educators on the necessary skills needed for

readers to approach these types of texts (RAND Reading Study Group, 2002; Coiro, 2003). Interacting with online texts may be overwhelming for most readers as they are not equipped with the appropriate strategies to do so. Thus, there is a need to have a system that will assist readers to read, comprehend and interact with technology in a meaningful way. Given this background, this paper reports the background to the study, the design and development of Interactive-English Language Literacy System (i-ELLS) as well as the testing and evaluation of the literacy system for online reading comprehension.

DEVELOPMENT OF I-ELLS

i-ELLS is a prototype of an interactive literacy system with a focus on reading. It is designed to integrate research findings on reading strategies into a web-based platform that allows for both individual and social learning (Hazita Azman, Afendi Hamat, Nor Fariza Mohd Nor, Nadzrah Abu Bakar & Noorizah Mohd. Noor, 2008). The system can be used to deliver reading materials online or can be integrated into a wider system for learning. This section will discuss the pre-development and post development phases of the system. There were two stages to the pre-development phase of i-ELLS: i) identifying the online reading strategies used and ii) designing the features of tools for i-ELLS.

PRE-DEVELOPMENT OF I-ELLS

IDENTIFICATION OF ONLINE READING STRATEGIES

A study was initiated to investigate the online reading strategies readers applied in a computer-based learning environment (Noorizah Mohd. Noor, Nadzrah Abu Bakar, Hazita Azman, Nor Fariza Mohd. Nor & Afendi Hamat, 2009). The sample study involved 320 tertiary learners enrolled in the English for Social Sciences course which is a compulsory course for all first year learners. From the sample, approximately 73% were familiar with online learning; however all learners were active users of Internet. A 45-item questionnaire was developed to understand the different types of online reading strategies used by categorizing the items into cognitive, metacognitive and support strategies. These categories were based on Sheorey and Mokhtari's (2001, p. 438) descriptions of reading strategies. The categories are as follow:

1. *Metacognitive strategies* are those intentional, carefully planned techniques by which learners monitor or manage their reading. Such strategies include having a purpose in mind, previewing the text as to its length and organizations, or using typographical aids and tables and figures.
2. *Cognitive strategies* are the actions and procedures readers use while working directly with the text – understanding textual information. For example adjusting speed of reading, guessing the meaning of unknown words, re-read for understanding.
3. *Support strategies* are basically support mechanisms intended to aid the reader in comprehending the text such as dictionary, taking notes, or underlining or highlighting the text for better understanding.

Findings from the questionnaire enabled the authors to identify the different categories of reading strategies and reading style preferences of tertiary students when they do online and offline reading of academic texts. These categories would be a guide in determining the appropriate technological tools that can be used in the design of an online reading module developed for the non-native ESL tertiary learners.

It is imperative to note that the development of i-ELLS departs from the conventional online reading courseware commercially available in that the former takes cognizance of the use of reading strategies by the non-native reader when engaging in the academic reading process while ensuring compatible computer technological tools are used to enhance and to facilitate the reading process, content uptake and build a greater collective body of knowledge (Nor Fariza et al., 2009, Afendi et al., 2010; Hazita et al., 2010)

DESIGN FEATURES OF I-ELLS ONLINE TOOLS

The online i-ELLS tools were mainly designed based on the preferred reading strategies elicited through the questionnaire. The findings reported that:

- Students prefer online forum and chatting as a means to discuss texts with others who are learning English. Hence, tools such as discussion boards and synchronous chat were integrated into the design for students to post their opinions on the text that they are reading and to share their opinions with others online.
- Students indicate that reading aloud helps them to improve pronunciation and to enhance understanding of the texts. Thus, audio tools were incorporated for the purpose of synchronous chatting and to allow students to listen to the pronunciation as the text is being read aloud. The audio feature is also employed for personal purpose. At the same time, they will be able to make personal notes of words that they have difficulty pronouncing or understanding.
- Key strategies such as underlining and taking down notes on main ideas or key points as well as summarizing the text are important for the students to understand the text. To accommodate for this, annotation and My-Note tools were designed for i-ELLS.
- Students also need to use online dictionaries and thesaurus to help them in comprehending the text as their knowledge of vocabulary in English is low. To meet this need the electronic texts made available to the students are linked to appropriate and relevant online resources to help improve students' understanding of the text.

Based on these preferred use and needs of reading strategies elicited by the students from the questionnaires, several components were identified as necessary to be incorporated into the reading system. These components are annotation tools, discussion tools, my-note tool, dictionary tool and video tool (Nor Fariza et al., 2009; Afendi et al., 2010). The functions of each component are briefly discussed below.

ANNOTATION TOOL

The Annotation tool (FIGURE 1) that is implemented in i-ELLS system is a tool where learners are able to apply similar reading strategy in printed text onto online text. Learners can highlight, insert notes or comments to the highlighted information in the text and save the information for

future references. Thus, the notes are visible to the learner every time he/she goes back to the text. This reading activity makes it possible for learners to express their thoughts on the reading and can be used in their discussion.

In the i-ELLS system, the added value to the design of the annotation tool is the opportunity for social-collaborative learning, where learners can view other users' notes and access different viewpoints and understanding of the texts. Additionally, the tool allows for discussion on any particular text in the situation. Furthermore, involving students to do annotation will develop their understanding of the text and critical thinking skills. Besides that, annotation tool engages students in a process of co-constructing their interpretations of a text by way of a collaborative annotation activity through the discussion or chat and My-Note spaces provided.

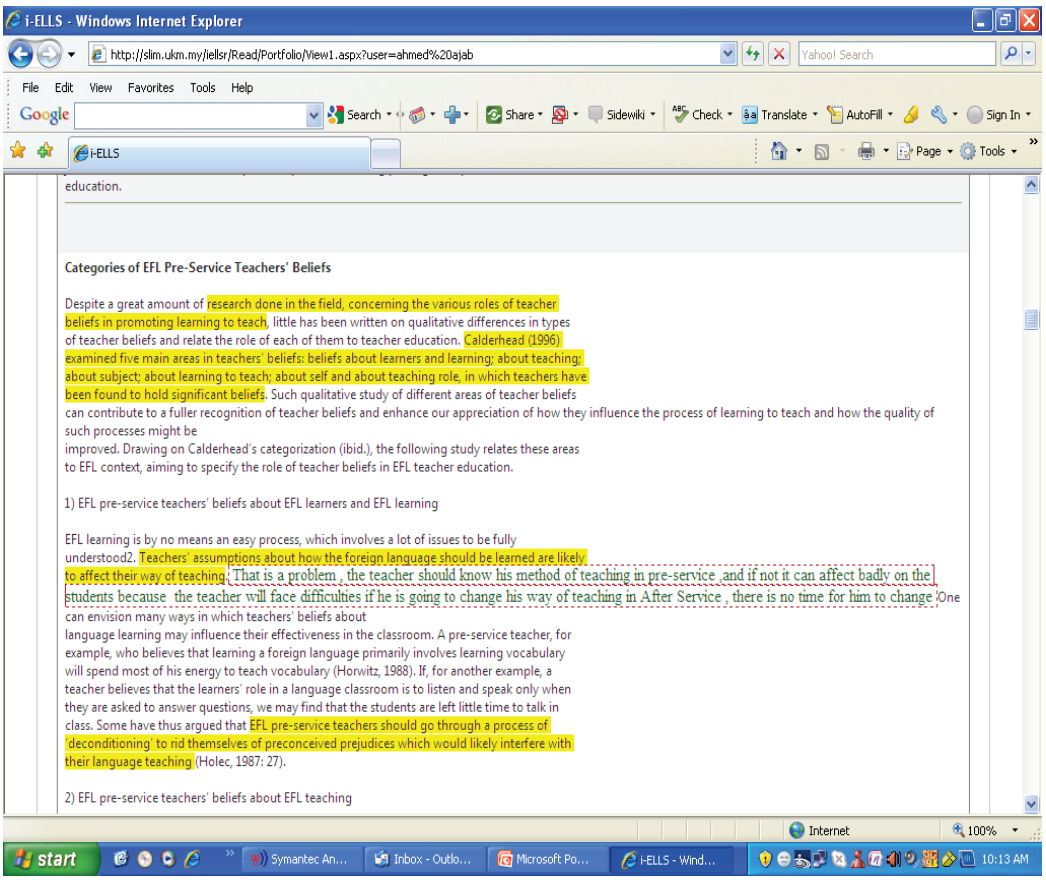

FIGURE 1: Annotation tool

DISCUSSION TOOL

This tool allows learners to discuss and exchange ideas, and to construct meaning online. Constructing meaning from online social interaction provides in-depth understanding of the text in different perspectives. Learners can use this tool to discuss the text with other learners, such as to discuss the reading content or to ask questions on problems they have with the reading. Through the use of the tool, learners are able to build a social reading community online which facilitates collaboration and sharing behaviours to help members to comprehend

the text actively and constructively. Thus, knowledge is transferred and developed through collaborative social reading practices.

FIGURE 2: Discussion tool

MY-NOTES TOOL

Most students use note taking to help them understand the text. Through note taking, the readers' skills in summarizing, synthesizing, and critical thinking are developed. The My-notes tool created in the system provides space for students to develop their note-taking skills online. This tool allows students to write any notes related to the text they are reading. They are able to re-write and edit their notes as many times as needed. The interactive environment of i-ELLS enables the students to receive feedback from fellow reading community to ensure accuracy of information understood as well as to view their understanding critically.

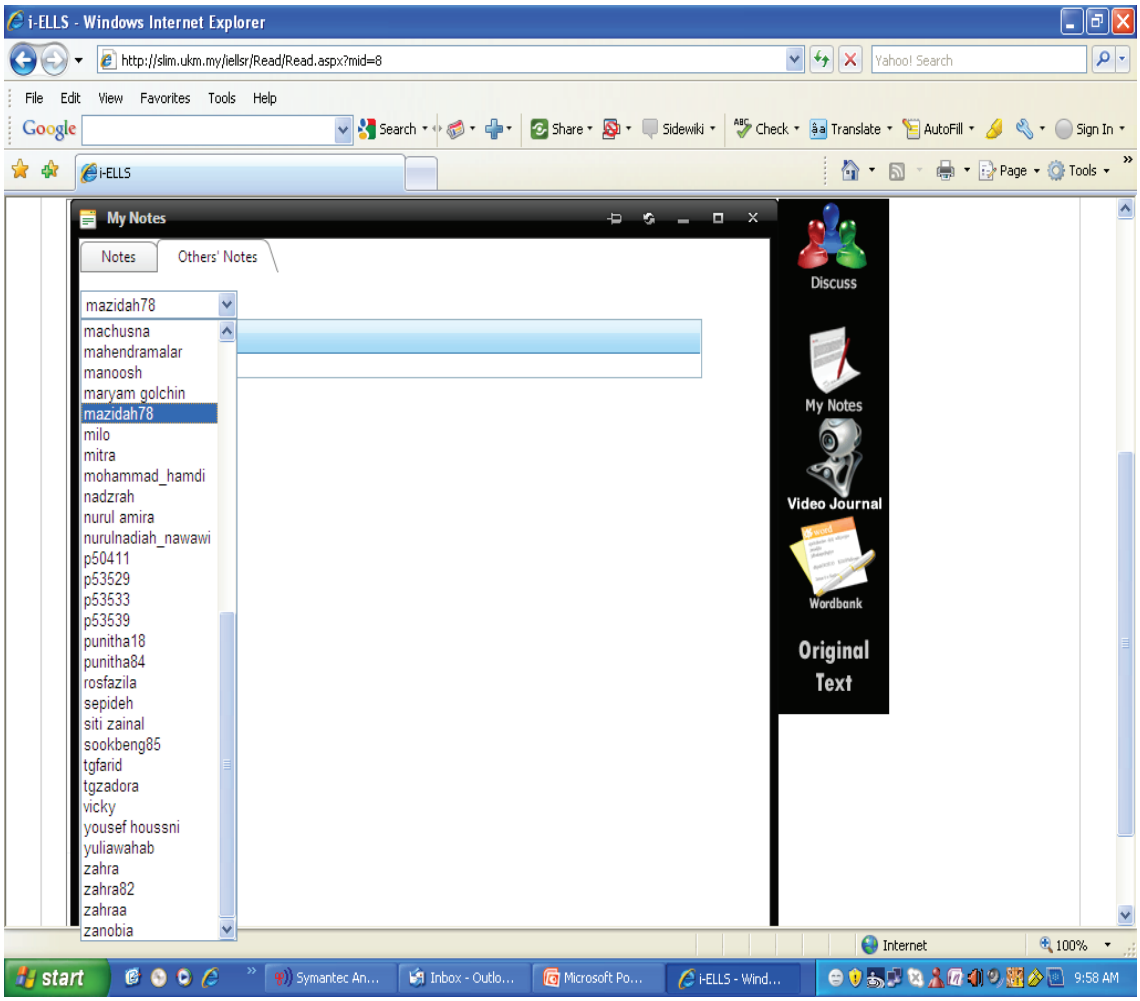

FIGURE 3: My-Notes tool

DICTIONARY AND TRANSLATION TOOLS

A fundamental feature of i-ELLS that accommodates the language proficiency need of the non-native readers of English is the integration of dictionary to support their understanding of difficult vocabulary in the text. This is because vocabulary knowledge has been clearly and strongly associated with reading comprehension (Graves et al. 2004). It was found that most learners in this study had difficulty in understanding the text without referring to the dictionary due to their limited vocabulary knowledge. In i-ELLS a built-in word-by-word dictionary was designed for the system where the learners are able to click on any word in the text and the meaning or synonym appears in the hypertext. In this way, students can save time searching meanings of difficult words in printed dictionary or online dictionary.

VIDEO JOURNAL

Video journal was another tool added to the design of the i-ELLS system to support textual, audio and video channel of communication. This tool was provided as an alternative to writing notes as some students had indicated that writing slows down their understanding/reading of

the text. The audio video could record their views of the text and make personal notes about the reading materials.

POST-DEVELOPMENT PHASE OF THE I-ELLS PROTOTYPE

The testing and evaluation of the system was an important phase of the development of the i-ELLS system (Nadzrah et al., 2011; Hazita et al., 2010). The prototype was pilot tested on a group of students (N=33) who were taking an English Language Studies course for one semester (4 months). At the beginning of the semester, the students were given training to familiarize themselves with the usage of the reading tools provided in the system using a sample text. A training manual was also provided for their reference. Students were encouraged to use all of the reading tools provided in the system while reading the articles.

Three academic articles were selected by the course lecturer as part of their reading assignment and uploaded onto i-ELLS. For each article, the students were required to answer some questions related to the articles. Students were encouraged to discuss the content of the article online with their classmates using the reading tools in the system. For the purpose of the study, they were reminded that face-to-face discussions in or outside the classroom as well as with their instructors were not allowed. The articles were uploaded at different times because the students needed to finish discussing the first article and then to submit their written assignment before the second and third articles could be uploaded. The responses to the questions posed for each article were submitted separately as a writing assignment.

At the end of the course, students were required to evaluate the effectiveness and usefulness of the reading tools in the system using a questionnaire, followed by focus group interviews. The questionnaire was designed to analyse the students' perception of i-ELLS system and features' usability and the extent to which they facilitate them in their reading. The 40-item questionnaire was divided into four main sections, information on level of computer literacy (Part A), perception of the use of the overall system in terms of its interface tools (Part B), degree of usefulness and facilitative factor of the reading and collaborative tools (annotation tool, discussion tool, my notes, video journal, dictionary, reading portfolio) (Part C) and overall perception of i-ELLS as an online reading system (Part D). The following findings report on the students' overall evaluation on the use of the system.

FINDINGS

OVERALL EVALUATION OF I-ELLS

Overall, the students gave positive feedback towards the use of the i-ELLS reading online system. Eighty seven point eight percent (87.8%) of the students indicated that they agreed and strongly agreed that "the system provides them opportunities to learn from each other outside class time", while 84.9% of the students agreed and strongly agreed that the system enabled them to improve their reading strategies, as well as discover new reading strategies (82.8%). In terms of improved reading skills, 84.9% of the students agreed and strongly agreed that they developed better scanning and skimming skills as well as new vocabulary (87.8%). Although 63.6% agreed that they had achieved their reading purposes, it was interesting to discover that they were still dependent and preferred the teacher to explain the text rather than reading online

(72.7%). The data also revealed that students preferred face-to-face discussion with friends rather than online discussion (81.8%). In general, students agreed they were motivated to use i-ELLS (63.6%), and they would recommend i-ELLS to their friends (87.9%).

TABLE 1: Overall perception of using i-ELLS

	Strongly Disagree		Disagree		Agree		Strongly Agree		Missing	
	N	%	N	%	N	%	N	%	N	%
1. The i-ELLS reading online system:										
a. provides opportunity tolearn from each other outside class time	1	3.0	3	9.1	18	54.5	11	33.3	0	0
b. enables me to improve my reading strategies	2	6.1	3	9.1	19	57.6	9	27.3	0	0
c. enables me to discover new reading strategies	2	6.1	4	12.1	17	51.5	9	27.3	1	3.0
2. i-ELLS helps me to improve my reading skills in										
a. scanning	1	3.0	4	12.1	23	69.7	5	15.2	0	0
b. skimming	1	3.0	4	12.1	22	66.7	6	18.2	0	0
c. paraphrasing	4	12.1	8	24.2	16	48.5	5	15.2	0	0
d. summarizing	2	6.1	11	33.3	15	45.5	5	15.2	0	0
e. learning vocabulary	0	0	4	12.1	18	54.5	11	33.3	0	0
3. I am motivated to read using i-ELLS	4	12.1	7	21.2	17	51.5	4	12.1	1	3.0
4. It is difficult to use i-ELLS	6	18.2	14	42.4	7	21.2	6	18.2	0	0
5. I have reading purpose	1	3.0	2	6.1	26	78.8	3	9.1	1	3.0
6. I am able to achieve my reading purpose using i-ELLS	5	15.2	6	18.2	17	51.5	4	12.1	1	3.0
7. I prefer the teacher to explain the text than reading online	4	12.1	5	15.2	16	48.5	8	24.2	0	0
8. I prefer to discuss the text with my friends in face to face interaction	1	3.0	5	15.2	17	51.5	10	30.3	0	0
9. I will recommend i-ELLS to my friends	2	6.1	2	6.1	23	69.7	6	18.2	0	0

Generally, the degree of usefulness of selecting online reading tools in i-ELLS was found to be high among the users of the prototype. The degree of usefulness of each of the tools in i-ELLS are reported below.

ANNOTATION TOOL

The findings revealed that the students used the Annotation Tool to help them comprehend the text by highlighting important point (97%), highlighting part of the text that they didn't understand (54.5%) and writing comments directly onto the text (75.8%). A majority of the students (84.9%) indicated that they 'remember points by highlighting' while 57.6 % shared their understanding of the text with friends. Almost all students (93.9%) suggested that the use

of the highlighting tool is especially useful for understanding in their process of reading the text.

DISCUSSION TOOL

Overall, most of the items in this section received a high percentage of agreement on the usefulness of the Discussion tool. For example, 93.9% of them agreed and strongly agreed that Discussion tool enabled them to view their friends' opinion as well as obtain feedback from their friends on the ideas they posted (90.9%). The students also agreed that the tool is useful because they can contribute ideas (90.9%) and gain more ideas (78.85), which enabled them to enhance their understanding of the text discussed (90.9%). In general, it can be said that discussion tool facilitated students' overall reading comprehension process.

MY-NOTES TOOL

Most students used the tool to reflect what they read (75.8%), and write their own notes about the text (72.7%). However, some indicated in the interview that they were unable to respond to the item (statement) as they did not use My Notes when reading, preferring instead to use Discussion Tool and Annotation Tool. Hence this tool is found to be redundant and should be reviewed in terms of its usefulness.

VIDEO JOURNAL

In the overall findings, students revealed positive perception of using the video journal. They agreed and strongly agreed that they can recall information at anytime (51.5%), and give immediate comments about the text (42.4%) with the visual mode. Surprisingly however, although these students indicated their preference to use the video journal to make notes, none of them used it. In the interview, some of the reasons given for not using the tool included being unfamiliar with the tool and needed more time to get used to it. Others stated that they lacked the training (S1, S5) and were not equipped with a webcam (S6, S9). This revelation highlights the need for a better training component to be included in the system to encourage the use of this tool.

BUILT-IN DICTIONARY AND TRANSLATION TOOLS

Most of the students found the dictionary and translation tools very easy to use and helpful when reading difficult texts. They merely needed to click on the words and phrases that required clarification to aid in understanding textual content. This quick reference helps them to maintain and sustain their reading process and meaning uptake while reading the text online without having to resort to dictionaries and thesaurus in hardcopies.

FEEDBACK FROM INTERVIEW

Focus group interviews were also conducted to gain an in-depth understanding particularly on the usability of the technological tools as well as suggestions for improvement of the system. Two groups of students consisting of five per group were interviewed at the end of the semester. Questions such as the students' general comments about the system, the time spent using the

system and the tools usability were posed. The interview data were then transcribed verbatim, and analysed thematically. The feedback indicated that most of the students (6 out of 10) found the system suitable for reading purposes. More importantly, the available online tools assisted students in reading and understanding the text. Yet, there were also feelings of apprehension and frustration expressed where students felt that they needed more time to familiarize themselves with using an online learning system. Thus, ample training of using such systems is necessary to facilitate students' reading online texts (Nadzrah et al, 2011).

CONCLUSION

This paper has discussed the background of the study, design, development and evaluation of an online reading system, aptly named the Interactive English Language Literacy System or i-ELLS, a prototype based on the mapping of students' reading strategies to the technology needed to support the activities. Essentially the research reported reveals that online academic reading environment can be active and meaningful for the readers with the applications of appropriate technology components such as annotation tools, discussion tools, note taking tools (My Notes) and reading portfolios that employ commonly preferred cognitive, metacognitive and supportive reading strategies. While the literature espouses that it is important for teachers to be aware of the role of technology and the way it is changing the way we read (Leu et al., 2000; Kasper, 2003; Pramela Krish, 2006), and to be aware that the employment of reading strategies in online and printed materials may not be the same (Anderson, 2003), this research has pointed out that it is more vital and imperative to ensure that the applications of computer technological tools used are made compatible to the readers' needs and preferred styles and strategies. Taking advantage of technology this way will expose learners to different perspectives on the knowledge uptake that give new challenges to learners, especially second language learners (Coiro, 2003). This paper has discussed the features and design of the digital tools of an online reading system, aptly named as the Interactive English Language Literacy System or i-ELLS, a prototype based on the mapping of students' reading strategies to the technology needed to support the activities. Furthermore, the students' experience of learning collaboratively through i-ELLS has the potential to facilitate them to become critical readers and thinkers as they uptake and transform knowledge more effectively. Furthermore, i-ELLS accommodates for online collaborative learning which Tomlinson and Henderson (1995) advocate as more effective as it allows for learner control. The next phase for this research development cycle then is to measure the effectiveness of using i-ELLS on actual reading performance.

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