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Instructional Design in the Cyber Classroom for Secondary Students' Basic English Language Competence

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ABSTRACT

This paper aims to explore instructional design of a cyber classroom for secondary students' basic English language competence. A paucity of support for low or under achieving students' English learning exists particularly at the secondary level. In order to bridge the gap, there has been demand for online educational resources considered to be an effective tool in improving students' self-directed learning and motivation. This study employs a comprehensive approach to instructional design for the asynchronous cyber classroom with the underlying premise that different learning theories can be applied in a complementary manner to serve different pedagogical purposes best. Gagné's conditions of learning theory, Bruner's constructivist theory, Carroll's minimalist theory, and Vygotsky's social cognitive development theory serve as the basis for designing instruction and selecting appropriate media. The ADDIE model is used to develop online teaching and learning materials. Twenty-five key grammatical features were selected through the analysis of the national curriculum of English, being grouped into five units. Each feature is covered in one cyber asynchronous class. An Integration Class is given at the end of every five classes for synthesis, where students can practice grammatical features in a communicative context. Related theories, pedagogical practices, and practical web-design strategies for cyber Basic English classes are discussed with suggestions for research, practice and policy to support self-directed learning through a cyber class.

Key words*: Instructional Design, Cyber Classroom, Online Content Development, Self-Directed Learning*

1. INTRODUCTION

Self-directed learning is not a new concept in education. It is a notion that has been emphasized in the student-centered curriculum. While there has been a variety of interpretations and applications in the educational arena, its primary concern lies in the learner's taking the initiative to pursue learning, and the responsibility for completing their learning. This is reflected in Knowles' definition of self-directed learning as a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating their learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes [1].

Studies conducted in various contexts support that self-directed learning is a characteristic of a successful language learner [2]-[7]. As Su and Duo note [8], it has been suggested that a goal of educators should be to help language learners become self-directed. Multi-faceted effort has been made to explore student's self-directed learning strategy. Advance in technology has reacted to needs for effective ways to engage students in self-directed language learning [9]-[14]. As Dawson, Mcfadyen, Risko, Foulsham and Kingstone point out [15], self-directed learning seems to respond to the needs from the rapidly-developing 21st century world of work and knowledge. This is related to Knowles' argument that the Information Age and the speed of technological development require individuals the skills that would allow them to assess their current level of skills and knowledge, and determine their ongoing learning requirements at their professional careers [16]. The role of technology in language learning is considered to be important in the effective implementation of the competency-based curriculum, where emphasis is given to students' self-directed learning skill and competencies for the 21st century.

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In response to the demand, the cyber home study system was introduced to help students engage in self-directed language learning. The government's policy to enhance the level of all the students' achievement turns its attention to support for low achievement students with the cyber home study system. However, there is a paucity of support for low or under achievement students' English learning, particularly at the secondary level. Support system for students with learning difficulties has been heavily centered on locally developed offline materials to help them with the basic level of English.

This study aims to develop the cyber self-access program that helps secondary students with difficulties in learning English actively participate, engaging in self-directed learning, enhancing autonomy, and achieving the standards required at the national curriculum. It also shows how different learning theories can be linked to instruction design for the cyber home study system for secondary low achievement students.

2. THEORETICAL BACKGROUND

2.1 Learning Theories in Instructional Design

Merrill, Drake, Lacy and Pratt define instructional design as a process of creating instructional experiences which make the acquisition of knowledge and skill more efficient and appealing [17]. They identify some of the assumptions underlying the science-based technology of instructional design, and clarify its role in the context of education. One key assumption is that the technology of instructional design is founded on scientific principles verified by empirical data. They emphasize that instructional design is a set of scientific principles and technology for implementing these principles in the development of instructional experiences and environments. Instruction design as a field is the use of the scientific principles to invent instructional design procedures and tools. This implies that instructional design procedures incorporate scientific principles involved in instructional strategies.

Merrill, Drake, Lacy and Pratt argue that if an instructional experience or environment does not include the instructional strategies required for the acquisition of the desired knowledge or skill, then effective, efficient, and appealing learning of the desired outcome will not occur [17]. Lim, in this respect, notes that instructional design has made a significant contribution to recognizing instructional technology as an academic and scientific discipline in terms of system and software [18]. This is in line with Gagné's assertion that the acquisition of different types of knowledge and skill require different conditions for learning [19].

The science of instruction is based on assumptions about learning and teaching. Learning theories can be applied in online instructional design for best practice. Among many theories on learning, Gagné's conditions of learning theory, Bruner's constructive theory, Carroll minimalist theory, and Vygotsky's social development theory could serve as most suitable theoretical frameworks for designing instructional learning environment in the self-access cyber classroom.

Gagné identifies five major types of learning level: verbal information, intellectual skills, cognitive strategies, motor skills, and attitudes. He contends each learning level requires different types of instruction. He also proposes a learning hierarchy that provides a basis for sequencing instruction. As Patsula indicates [20], the primary significance of the hierarchy is to provide direction for instructors and they can identify prerequisite to be completed to facilitate learning at each level. Gagné's nine instructional events and corresponding cognitive processes are known to serve as the basis for designing instruction and selecting appropriate media [21]. They include gaining attention, informing learners of the objective, stimulating recall of prior learning, presenting the stimulus, providing learning guidance, eliciting performance, providing feedback, assessing performance, enhancing retention, and transfer. As Kearsley puts [21], Gagné's hierarchy of intellectual skills is similar to Bloom's taxonomy of educational objectives for the cognitive domain: knowledge, comprehension, application, analysis, synthesis, and evaluation.

A major theme of Bruner's constructive theory is that learning is an active process where learners construct new ideas or concepts based upon their current or past knowledge [22]. According to Bruner's theory, cognitive structures, as Patsula notes [20], are used to provide meaning and organization to experiences, and allow the individual to go beyond the information given. Kearsley emphasizes that at the heart of the teacher's roles is to translate information to be learned into a format appropriate to the learner's current state of understanding by organizing it in a spiral manner [22]. This role is considered to help students continually build upon what they have previously learned. He goes on to suggest that Bruner's theory can be applied to instructional design with the principles of readiness, spiral organization and going beyond the information given. Related to the theory are Fahy's suggestions[23], as cited in [20], that students can learn principles by attracting, holding and focusing attention, and retention can be improved by sequencing screens and presenting related materials together.

Carroll's minimalist theory is based on studies of people learning a wide range of computer application including word processors and detabases [24], as cited in [20]. The key of the minimalist theory, as Kearsley puts [25], is that course designers must minimize the extent to which instructional materials obstruct learning. He adds that the theory focuses the design on activities that support learner-directed activity and accomplishment. Jones and Farquhar suggest pedagogical practices that important information should be kept at the top of the page, and frames should be simple and consistent in design of text, graphics and sound to limit cognitive overload [26]. In a similar vein, Gillani and Relan assert that simplicity and consistency eliminates overload [27]. According to such assertions, multimedia components should be used to reinforce rather than distract from learning.

The key concept of Vygotsky's theory is that social interaction plays a fundamental role in the cognitive development. As Kearsley notes [28], an important aspect of Vygotsky's theory is that instruction is most efficient when students engage in activities within a supportive learning environment and when they receive appropriate guidance. In applying Vygotsky's theory of social cognitive development, Gillani and Relan suggest that the interactive nature of frames in interdisciplinary instructional design has the potential of

implementing cognitive theories as its theoretical foundation [27]. From these assertions, Patsula draws implications for online instructional design such as simplifying navigation; creating effective menus, including indexes; table of contents and search capabilities; clearly identifying content with appropriate headings and titles; and placing most important information on the top-left [20].

Patsula suggests that suitable learning goals should be first established to make online learning and teaching materials [20]. He goes to contend that to benefit the learner by facilitating the learning process it is necessary to apply proven learning theories, pedagogical practices and practical web-design strategies and guidelines to instructional design. As mentioned earlier, such underlying principles and application to instructional design are considered to make a contribution to the recognition of instructional technology as an academic and scientific discipline in terms of system and software.

2.2 Models of Instructional Design

Among several instructional design models such as ADDIE model, Rapid Prototyping, Dick and Carey system, Guaranteed Learning. and Smith/Ragan Model, the ADDIE model is the most commonly used[29]-[31]. Reiser and Dempsey note that most of the current instructional design models are variations of the ADDIE process [32]. It contains five phases: analysis, design, development, implementation, and evaluation. It illustrates the processes involved in the formulation of an instructional design. Analyze, the first phase of content development refers to gathering information about audience, tasks, goals etc. The gathered information is classified to make the content more applicable and successful. The Design phase begins with writing learning objectives. Identifying tasks and breaking them, and determining activities required to meet the goals identified in the Analyze phase [30]. The third phase, Development, involves the creation of the activities that will be implemented. The developed content is then implemented. This Implementation stage tests materials to see if they are functional and appropriate for audience. The Evaluation phase ensures the materials achieved the goals and assesses the materials, and revises them if necessary. As Seels and Richey emphasize [32], the final phase is vital because it provides data used to alter and enhance the design. It is also important that revisions should and can be made throughout the entire process [30].

Keller's work on motivation has made a contribution to the instructional design by applying motivation theories and by developing the ARCS Motivation. Keller's ARCS Model of Motivational Design [33]. It has four main areas in the model: attention, relevance, confidence, and satisfaction. In the ARCS model, Attention refers to the interest displayed by learners in taking in the concepts being taught [33]. The most important part of the model is grabbing attention because once learners are interested in a topic, they are willing to invest their time, pay attention, and find out more. According to Keller [33], relevance must be established by using language and examples that the learners are familiar with. He proposes strategies like goal orientation, motive matching, and familiarity. Confidence focuses on establishing positive expectations for achieving success in learning. Satisfaction is related to satisfaction or reward from a learning experience. This satisfaction can be from a sense of achievement, praise, or mere entertainment. Keller suggests that to keep learners satisfied, instruction should be designed to allow them to use their newly learned skills as soon as possible in an authentic setting [33].

3. METHOD

The current cyber self-access and self-paced program was based upon the ADDIE model. Web-design strategies from the ARCS model were applied to the instruction design. The cyber self-study materials were developed based on Gagné's conditions of learning theory, Bruner's constructivist theory, Carroll's Minimalist theory, and Vygotsky's theory of social cognitive development. The following shows how these related theories, pedagogical practices and web-design strategies were applied at each stage of the ADDIE model.

At the analysis phase, information was gathered to analyze language features that students needed to learn for basic communicative competence. The collected data included the overall goals of the program, the national curriculum of the secondary English, time constraints, and users' needs. The information was analyzed to draw the content of the whole program (See Table 1). Decisions, then, were made about the numbers of units and classes of the program to make the content applicable and effective in achieving the identified goals.

At the design phase, the decisions that were made upon the gathered information provided the explanation of how the learning should be acquired, in conjunction with the learning theories and instructional design models. Beginning with writing learning objectives, the design phase identified tasks and broke down to be manageable. Decisions were made on the kind of activities required for the students to meet the goals identified at the previous stage. The overall framework of each unit and class was designed for effective learning to take place (See Fig. 1 and Fig. 2). To enhance motivation and learning in place, the content materials and course components were divided into units. The structure mapped out the organization and connection for individual units. The relationship between content units and course component units were also mapped out. The blueprints of the program were designed in this stage. Delivery strategies appropriate to the cyber classroom were selected with attention to details including the visual design of the user interface and the layout of the content.

The development phase created the implementation of the designed activities in each class. The development process included three main steps: content development, storyboard development, and courseware development. The integration of the instructional methods and media elements was done by developing the storyboard. The storyboard described all the components of the interactive products including texts, images, interactions, and assessments. The blueprints of the program were assembled in this stage. Diverse document types were added to increase variety to the program. The asynchronous cyber classroom was developed to outperform all modes of instruction in enabling students to simultaneously integrate visual, auditory and kinaesthetic processes. It was developed to

provide learners with more engaging learning activities enabling higher levels of learning. It was expected to integrate these three sensory functions to result in higher levels of learning.

After the content was developed, all materials were tested to determine if they are functional and appropriate for the intended audience. This stage included installing the end product in the cyber classroom. This stage aimed to pre-test the e-learning content prior to the real implementation across the country. Regarding usability, all the aspects of the course were tested from the user's perspectives including content accuracy, content display, links, functionality of individual course components.

The feedback and comments gathered at the implementation stag were analyzed for the evaluation of the program. The evaluation was done to ensure the materials achieved the desired goals, and the quality of the final version of the content before implementing it to the whole group of students. This final phase was vital because it provides data used to alter and enhance the design by making revision. For the evaluation of the program, data was gathered from different stakeholders including teachers, students, researchers, and program designers. The gathered data was analyzed, and areas to be improved were identified, and revised at the different stages of the overall process.

4. SELF-STUDY MATERIALS DEVELOPMENT

4.1 Contents

The analysis of the national curriculum of the secondary English reveals the language points required to reach the standards for communicative competence. The list of the language features are graded and sequenced according to their linguistic complexity and frequency. They are presented from simple and frequently used to complicated and less frequently. Related language features are clustered together or put in a close binary form like adjective-adverb. Integration at Class 6 in each unit covers all the language points from 5 previous classes in a comprehensive way. As shown in Table 1, there are 5 units and 30 classes in the current cyber self-access materials.

Table 1. Learning topics

unit	class	topic
1	1	What's your name?
	2	You and I
	3	Beautiful or beautifully
	4	Cinderella, come back by 12
	5	She is beautiful and kind
	6	Yummy Yummy delicious food show
2	1	I pizza like, No! I like pizza
	2	Is or is not
	3	Are you or is he?
	4	Who, when, where, what, how, why?
	5	Open! Don't open!
	6	Who is this? Quiz Show
3	1	Be verb song
	2	Spider man, can you help?
	3	I loved, love, will love you
	4	Is dancing, was dancing?
	5	I have finished my homework
	6	The missing diamond
4	1	Who has longer hair, Rapunzel or Elsa?
	2	Mom, mom, mom
	3	Read or to read?
	4	I like playing baseball
	5	Interested or interesting?
	6	Who is better?
5	1	Chasing or is chased?
	2	I like people who make me smile
	3	This is the place where my brother works
	4	If I were a girl...
	5	I wish ...
	6	Guilty or innocent?

Table 2. Learning features

unit	class	language features
1	1	noun
	2	pronoun
	3	adjective-adverb
	4	preposition
	5	conjunction
	6	integration
2	1	sentences
	2	affirmative/negative sentence
	3	yes-no question
	4	wh-question
	5	imperative/suggesting/exclamatory sentence
	6	integration
3	1	be-general verb
	2	auxiliary verb
	3	present/past/future tense
	4	progressive tense
	5	perfect tense
	6	integration
4	1	comparative
	2	superlative
	3	infinitive
	4	gerund
	5	participle
	6	integration
5	1	active/passive voice
	2	relative pronoun
	3	relative adverb

4	subjunctive mood 1
5	subjunctive mood 2
6	integration

The topics appropriate to dealing with language features are partly drawn from the analysis of the national curriculum. Some topics are drawn from other references on English language learning. The cognitive traits of the secondary students are taken into account in choosing class themes.

4.2 Framework

Fig. 1 shows how the components of classes are organized as the instructional framework. The framework was based upon the assumptions from Gagné's hierarchy of intellectual skills and Bloom's taxonomy of educational objectives for the cognitive domain.

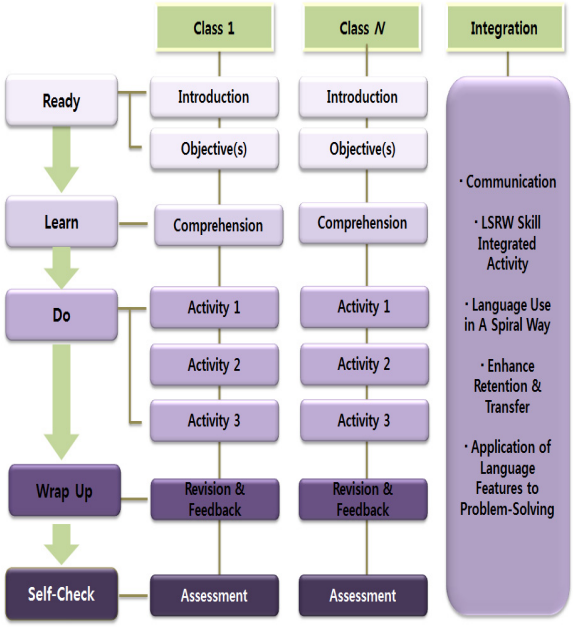

Fig. 1. Unit structure

There are five steps in the learning flow of each class: ready, learn, do, wrap up and self-check. Fig. 2 shows what each step entails. The component of Introduction in Ready stage is developed to serve the purpose to bring about effective learning by exposing students to learning goals at the beginning. The Activities in Do stage are presented in a hierarchy of the goals for cognitive domain mentioned above.

Do stage is followed by Wrap Up stage where students consolidate learning by asking questions and revising what they have learned throughout the class. For Self-Check students are provided test items to see if they have achieved the learning objectives of each class. The test results provide information on individual students' strengths and weakness. Actions can be taken to help students improve their learning.

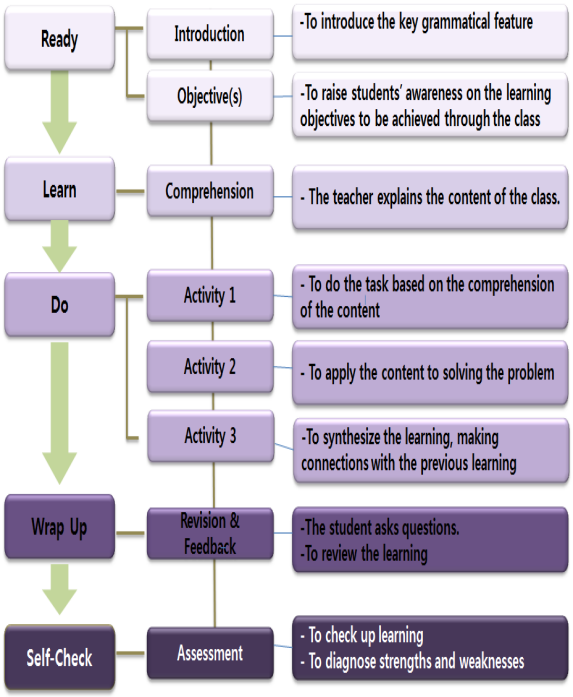

Fig. 2. Class structure

4.3 Learning Activities

Each stage of one class provides learning activities designed to serve its purposes effectively. Learning activities of each stage are elaborated with examples that show how underlying assumptions are reflected in the development process.

4.3.1 Ready

The activity presented in Ready stage is closely related to the affective traits of the secondary students. A B-boy is dancing to the rhythm with words about the grammatical feature(s). The following figure shows the activity of Class 1 in Unit 5, whose language feature is active and passive voices. The word of the music deals with differences between active and passive voices.

Fig. 3. Examples of ready activity

In order to raise students' awareness of the target grammatical feature, the key grammatical features are highlighted when the music plays the relevant expression. Each class has a different genre of music, and the B-boy dances to the music. In this activity students are exposed to the language features in chunks used in communication.

4.3.2 Learn

At Learn stage the teacher explains the grammatical feature(s) of the given class using different instructional strategies. Teaching strategies are determined to help students learn better. Fig. 4 shows how the instruction strategies can be different depending on content and objectives. The teacher at the first example from Class 1 of Unit 2 teaches how English sentences are structured in comparison to the Korean sentence structure. Animation is used to explain the learning point using the student-centered way.

Fig. 4. Examples of language feature learning

In explaining active and passive voices in Class 1 of Unit 5, the computer graphic effect is used when the teacher breaks the window. The teacher explains her action from the window's side as well as the boy's. The CG effect is used to make the context more real than the teacher's oral explanation at the traditional lecture model.

4.3.3 Do

The students apply what they have learned at the previous stage to completing the tasks at Do phase as shown in Fig. 2. The activities at Do stage are graded and sequenced according to difficulty level. At Learn stage of Class 1, Unit 5, students learn about the use of active and passive voices. Then they apply the knowledge to complete the learning tasks at three levels: Activities 1, 2 and 3. Fig. 5 illustrates how three levels of activities are graded and sequenced. At the first example, students complete the active sentence, 'Mr. Bell invented the telephone.' by filling the blank. They moved on to complete the passive sentence by filling the blanks. Students with the help of the teacher apply the knowledge on active and passive voices to complete the active and passive sentences.

Fig. 5. Examples of learning activities 1~3

At Activity 2 the student interact with the teacher by using active and passive voices of regular verbs, and then irregular verbs at Activity 3. As a strategy of encouraging students' participation in the learning, one of the teacher's pupils plays a student role in the activity. Unlike the first activity, the situation is given, and the student interact with the teacher to complete the task to create new sentences using active and passive voices with regular and irregular verbs.

4.3.4 Wrap-Up

Wrap Up sage comes after the practice of language features through the application to completing different levels of tasks. In this stage, students have an opportunity to consolidate learning through questioning and revising what they have learned. The instructor's own pupils take part in the class as a student in the cyber classroom, as in Do stage. As shown in the following examples, a variety of activities can be used to consolidate learning. The activity type can be determined by the nature of grammatical features.

Fig. 6. Examples of wrap-up

In Fig. 6, the left example shows the student asks her teacher when *a* and *an* should be used in front of a countable noun in Class 1 of Unit 1. The right example illustrates one student in the teacher's class revises what she has learned in the given class on Wh-questions. While revising the class, the student gets feedback from the teacher, which helps her consolidate learning. Such consolidation activities are significant in self-directed learning, as students take responsibility for their own learning by using meta-cognitive strategies.

4.3.5 Self-Check

Self-Check serves the purpose of checking if the student achieves the learning goal(s) of a cyber class. It also helps students diagnose students' strengths and weaknesses. Types of

materials vary from multiple choices to completion type items. They are determined by the content and learning objectives. The first example in Fig. 7 is designed to check if the student understands the English sentence structure after learning Class 1 of Unit 2.

Fig. 7. Examples of self-check

The left example in Fig. 7 shows a True/False test item is provided to see if the student understands active and passive voices of Class 1, Unit 5. The test item on the right illustrates the format of check-up can be various. To check up the student's understanding of active and passive voices, a short excerpt of a pop song, "Because you loved me" is played and the student are required to choose the expression appropriate to the blank. Audio materials are used in Self-Check stage. Language skill integrated test items are provided to improve the student's English in a balanced way.

Answer Key and Tips are provided to every test item to help students solve problems themselves. Fig. 8 shows an example of answer key and tips for the question about the sentence structure of Class 1 of *Unit 2, I pizza like, No! I like pizza.*

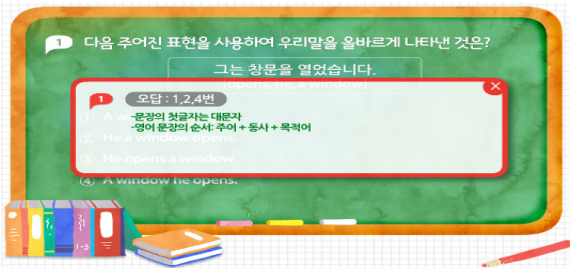

Fig. 8. Example of answer key and tips in self-check

Answer keys and tips are provided to encourage students' self-check about their own learning. Tips provided with answer keys cover the key point of the learning goals and clues in solving given problems.

4.3.6 Integration

As shown in Table 1, there is Integration class as the last (6th) class of each unit. The instructional goal of this class is to help students improve their communicative competence by putting what they have learned in the previous 5 classes together in a meaningful context. Integration of each unit has different topics. The language features that students have learned are used in a context where the participants in the cyber class interact with each other in a social context. Fig. 9 shows how each Integration class helps students' use vocabulary and language features in spiral way, and enhances retention and transfer. In the first example, the teacher hosts Yummy Yummy delicious food show. He explains the recipe of a food using the expressions those and them, which students are already exposed to in the previous classes.

Fig. 9. Examples of integration class

The example on the left shows the quiz show where the teacher and his students play a show host and competitors, and communicate with each other using language they have learned in the previous classes of the given unit. A scene of a basketball game illustrates the students take part in the game, practicing language features in a spiral way to compare two teams. In the other Integration classes, teachers and students are put in a situation where they need to apply what they have learned to solving the given problems.

5. SUGGESTIONS

The cyber self-access class has been delivered through the learning platforms of 17 local offices of education across the country. While the self-study program with other subject programs is open to all the secondary students and teachers, it has not been frequently used due to the lack of promotion and guidance. Efforts need to be made to expand its use to a wider audience and increase beneficiary of self-study at different levels.

The promotion of the program should be facilitated at the government level through the local offices of education. At the school level, it can be suggested that teachers make most use of the cyber self-access materials in integration with after-school activities as well as the regular curriculum of individual schools. From the material developer's perspective, guidelines for teachers and students should be developed with what benefits they can get from using the program. Longitudinal studies need to be conducted with users in various contexts to investigate its effects on English language learning. The findings from the

studies are expected to provide useful implications for program evaluation, material improvement, and support for users. The results of program evaluation should be fed back in quality control. Research also should be done on the integration of the self-study class with other web-based instruction system through different platform. It can be suggested at the technology level that the service should be provided through the mobile device platform.

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