Enhancing the English learning effectiveness of 8th grade students using an online interactive English system

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ABSTRACT: The Taiwanese Government has recently given great impetus to English education by including it as a compulsory subject to be taught from the third grade at elementary schools. Private enterprises regard GEPT certification as one of the basic demands in personnel recruitment, as well as the Government's demands regarding all public officers' English proficiency. The research purpose of this article is to understand students' learning processes, effectiveness and attitudes via an online interactive English learning system, which was created by the NETPAW testing centre of the Republic of China Multimedia English Language Instruction Association (ROCMELIA), which generated a reciprocal table with the Common European Framework. This study adopted a quasi-experimental research design of 217 8th grade students in central Taiwan. The results show that students who learned English via the online interactive learning system and traditional teaching methods performed better than those who learned English via traditional teaching methods only. Also, the interactive learning system helped motivate students to learn English, and enhanced their listening and reading proficiency. It is apparent that the online Web-based learning system is a worthy and applicable approach to learning English.

INTRODUCTION

English is the most important international language as well as a communicative tool in the modern era of globalisation and the global community. Brown observed that *learning a second language is a long and complex undertaking* (in [1]). As in other areas of Asia, English is used as a foreign language in Taiwan where there are many people who strive to acquire for themselves a good English education in the elementary, junior high and senior high schools, as well as at colleges and universities. However, most students still cannot communicate well with English native speakers after studying English for several years.

Whether a student can be successful in learning a foreign language is determined by many factors. Theoretically, foreign language learners can learn a foreign language well so long as they are provided with a good language learning environment, plenty of study time, strong motivation, effective teaching and learning methods, strategies, enough teaching materials, and a thoughtful teacher who recognises learners' needs [1-4].

There are many reports about the effective use of Internet technologies, Web resources and multimedia learning programs in English as a Second Langauge (ESL)/English as First Language (EFL). In Taiwan, English as a second language is not official. The entire student populace of Taiwan is now engaged in an island-wide struggle to master English. The nature of languages makes technology-enhanced language learning an optimal instructional medium because language learning requires a lot of practice and interaction. Although English teachers may apply different teaching approaches in the classroom, some more effective than others, many students still manage to get high grades in English. In any case, a good English learning environment is very important for EFL learners. This so-called English language environment includes everything that the EFL learner hears and sees in the target language. It may include a wide variety of activities – conversation with English teachers and peers, reading newspapers, listening to radio programmes, audiotapes, CDs, watching television, movies, videotapes, DVDs and studying language programmes using multimedia, hypermedia and the Internet [2].

LITERATURE REVIEW

The advantages of Web-based learning are numerous and varied. Research has confirmed the abundant advantages of Web-based learning, such as time saving, cost reduction and space saving, as well as the increased opportunity for independent and personalised learning [5]. Moreover, experts predict that in the next few decades, over 50% of the student population will be educated using online learning and technology. It is predicted that the average class size will be 1,000+ students and that these learners will be taught by an expert in his/her field of knowledge [6]. Compared with traditional instruction, Web-based technologies can provide students with more motivation and interest as they access multimedia and other innovative tools in an interactive and authentic learning context. Thus, the traditional classroom must make way for the virtual classroom, traditional learning cyber-learning or e-learning and electronic testing or e-assessment for old-fashioned paper-and-pencil examinations, which may become largely obsolete. Online learning not only enhances learner interaction and output, but also provides a more positive learning environment for students. Besides, online participants have found that Web-based instruction facilitates the sharing of ideas given the broader scope of people using the World Wide Web (WWW). When they practice with online exercises, such as multiple-choice questions and short answer questions, their responses will be evaluated instantly and feedback forthwith provided. At the same time, users' data are stored in the back-end server database so that instructors can retrieve and analyse them at a later time [7].

In a study of the effectiveness of using New Horizon College English Online (NHCE), an online EFL course management and learning system, Da states that by using the interactive system, an instructor can reduce classroom time normally devoted to reading and listening instruction, and pay more attention to speaking and writing skills [7]. Such refocusing of classroom instruction on productive skills (listening and speaking) is feasible. With the help of an interactive learning system, students can learn on their own to acquire the receptive skills (reading and writing). Spending less time on receptive skills in the classroom will not adversely affect students' acquisition of these skills. Moreover, the instructor can afford to constantly monitor students' online learning process via the tracking functions of the online learning software.

The most often cited theoretical basis for Computer Mediated Communication (CMC)-based foreign language learning is constructivism, which originates from research in psychology by Piaget, Bruner and Vygotsky. Constructivist learning is based on students' active participation in problem-solving and critical thinking during a learning activity that they find relevant and engaging [8]. Vygotsky divides human knowledge into three levels: recognition, understanding and mastery [8]. The teacher's job is to assist students in reaching the higher levels of knowledge. In terms of language education, students need more exposure to the targeted materials and more practice to be able to understand and enhance their knowledge before they can achieve the level of mastery [1].

THE THREE LEARNING THEORIES

Fun, Efficiency and Association Theories (FEAT)

There are three important theories behind efficient language learning. Chuang proposed three theories behind efficient language learning: the Fun, Efficiency and Association Theories (FEAT) [9][10]. This research proved that these theories are useful for language teachers to use in order to teach their students.

The Theory of Fun is to promote the application of interest in language instruction. It is essential to let students learn English happily and naturally, that is, by having them, through the vehicle of inter-language, approximate the social communication of native speakers. As with other subjects, language learning will be more efficient when it is fun. There are three factors can contribute to making language learning more fun: stories/jokes, whether in narrative or dramatic form, ingenuity and multimedia [1].

The Theory of Efficiency is to emphasise efficiency in language learning. In order to help students acquire target language skills efficiently, teachers should make good, creative use of the fun and association elements, as well as appropriate teaching techniques and tools [1].

The Theory of Association is to make language learners easily remember what they are learning. Language learning is an elaborate and complex process. There are three issues that should be taken into consideration to make language learning easier. First, the contents should not be too difficult. Second, the four language skills of listening, reading, writing and speaking have to be integrated in each learning session. Third, texts have to be associated with multimedia so that sound, animation, graphics and video can help students understand and remember the text [1].

Sociocultural Constructivist Approach

In recent decades, the theories of Dewey, Vygotsky and Leont'ev have placed emphasis on interpersonal, experiential and process-oriented learning; these have influenced more and more people in the field of education [8][11][12]. Vygotsky's social constructive theory, with the view that learning is both socially-based and integrated, has three assumptions. First, learning is a social activity. Second, learning is integrated. Third, learning requires active student engagement in class. Vygotsky believed that interpersonal behaviours are the basis for new conceptual understandings in cognition and communication. Also, he believed that oral and written learning are strongly related. For Vygotsky, students who engage in classroom activities will be motivated for literacy learning and they will have the best chance of achieving such a full degree of communicative competence to discuss and learn language and literacy skills. Sociocultural constructivism, in other words, emphasises engaging learners in problem solving, situational and cooperative learning. The advent of multimedia computer and Web-based technologies has made this shift more attractive – although not unproblematic – in its implementation [13][14].

Behaviourist Approach

Actually, much of today's pedagogies and traditional computer-based learning materials have been greatly influenced by the behaviourist approach derived from Ausubel and based on Gagne's five categories of learning: attitudes, intellectual skills, cognitive strategies, motor skills and verbal information [15]. This behaviourist approach regards *learning as predominantly concerned with information processing* [16].

The Complement

While there are quite different approaches to teaching students, do behaviourist approaches and Web-based constructivism contradict each other? Borrowing a statement from Felix, we get a clear view that they complement each other:

> *On the one hand, we have the ability to expose learners to reasonably sophisticated automated activities that will engage them in autonomous, predominantly cognitive and metacognitive processes, informed by theory drawing on the work of Gagne. On the other, we are in a position to exploit the unique opportunities of networked systems to engage students in authentic constructivist learning, in which students interact and collaborate in process-oriented real-life activities, informed by theorists such as Vygotsky and Dewey. Although quite different, the two schools of thought complement each other well in an online environment, especially if we take some care to humanize and personalize the former as much as possible within current technological limitations* [16].

The NETPAW-CEF Reciprocal Table

The Common European Framework has been adopted by the Ministry of Education in Taiwan and international test institutes like the ETS and Cambridge. The Ministry of Education stipulated that each test institute should have their reciprocal table published on the Internet. Table 1 was already published on ROCMELIA's Web site, which indicates that the NETPAW basic, low intermediate, intermediate and high

Table 1: The NETPAW-CEF table.

Users	CEF	The CEF *Can-Do* List	NETPAW
Proficient User	C2 Mastery	Can understand with ease virtually everything heard or read. Can summarise information from different spoken and written sources, reconstructing arguments and accounts in a coherent presentation. Can express himself/herself spontaneously, very fluently and precisely, differentiating finer shades of meaning even in more complex situations	N/A
	C1 Effective Operational Proficiency	Can understand a wide range of demanding, longer texts and recognise implicit meaning. Can express himself/herself fluently and spontaneously without much obvious searching for expressions. Can use language flexibly and effectively for social, academic and professional purposes. Can produce clear, well-structured, detailed text on complex subjects, showing controlled use of organisational patterns, connectors and cohesive devices	N/A
Independent User	B2 Vantage	Can understand the main ideas of complex text in both concrete and abstract topics, including technical discussions in his/her field of specialisation. Can interact with a degree of fluency and spontaneity that makes regular interaction with native speaker quite possible without strain for either party. Can produce clear, detailed text on a wide range of subjects and explain a viewpoint on a topical issue giving the advantages and disadvantages of various points	High Intermediate
	B1 Threshold	Can understand the main points of clear standard input on familiar matters regularly encountered in work, school, leisure, etc. Can deal with most situations likely to arise when travelling in an area where the language is spoken. Can produce simple connected text on topics that are familiar or of personal interest. Can describe experiences and events, dreams, hopes, and ambitions and briefly give reasons and explanations for opinions and plans	Intermediate
Basic User	A2 Waystage	Can understand sentences and frequently used expressions related to the area of most immediate relevance (eg very basic personal and family information, shopping, local geography, employment, etc). Can communicate in simple and routine tasks requiring a simple and direct exchange of information on familiar and routine matters. Can describe in simple terms aspects of his/her background, immediate environment and matters in the area of immediate need	Low Intermediate
	A1 Breakthrough	Can understand and use familiar everyday expressions and very basic phrases aimed at the satisfaction of needs of a concrete type. Can introduce himself/herself and others, and can ask and answer questions about personal details such as where he/she lives, people he/she knows and things he/she has. Can interact in a simple way provided the other person talks slowly and clearly, and is prepared to help	Basic

intermediate levels are equivalent to the A1, A2, B1 and B2 levels of the Common European Framework, respectively [17].

RESEARCH PURPOSES AND QUESTIONS

The purposes of this study were constructing an online interactive learning system, investigating how Web-based interactive learning systems affect 8th graders' learning achievements and attitudes, and providing suggestions for 8th grade English teachers.

Two research questions were raised based on the following research purposes:

- Do online interactive learning systems enhance 8th grade students' listening proficiency?
- Do online interactive learning systems enhance 8th grade students' reading proficiency?

Two null hypotheses were proposed based on the above research questions, as follows:

1. Online interactive learning systems have no statistically significant effect on junior high school students' listening abilities;
2. Online interactive learning systems have no statistically significant effect on junior high school students' reading abilities.

RESEARCH DESIGN AND PROCEDURE

The study had a quasi-experimental research design. The participants were 217 8th grade students (totalling six classes) at Mailiao Senior High School of Yunlin County in Taiwan. The researchers selected two high academic proficiency classes, two middle academic proficiency classes and two low academic proficiency classes from the whole 8th-grade level of students. The researchers divided these six classes into the experimental and control groups.

The whole research procedure took about three months. The treatment was via online interactive learning systems. The online interactive learning systems in this study refer to Web sites offered by the instructors that students could access on their own whether in class or at home. Thus, they could be visited in the multimedia laboratory of Mia-Liao Senior High School.

The experimental group received instruction that combined both traditional instruction via online interactive learning systems. The control group received traditional English instruction only. The instruction period for each class for both groups was the same. All participants were given a pre-test before the treatment and a post-test after treatment. The tests had already been piloted and the reliability for each test was 0.931 for the basic listening and 0.783 for the basic reading.

The two teachers (one for the experimental group and the other for the control group) who participated in the study had two to three years of teaching experience each and were professionally similar. Tables 2 and 3, as well as Figure 1, represent the research design, which is as follows:

- *Students' basic abilities*: students' basic abilities included one and a half years of English at the basic level and one and a half years studying computer operating skills;
- *Teachers' professional abilities*: the two English teachers had a teaching certificate and both majored in English at a university; they also had at least two to three years of teaching experience each;
- *Teaching materials*: besides the normal English teaching materials, the English teachers adapted useful materials available on the Web from refs [18] and [19].

Table 2: The distribution of proficiencies between the experimental and control groups.

Level	Experimental Group	Control Group
High level (two classes)	H1	H2
Middle level (two classes)	M1	M2
Low level (two classes)	L1	L2

Table 3: The research design model.

Group	Pre-Test	Treatment	Post-Test
Experiment	Y1	P	Y2
Control	Y3	T	Y4

Notes: Y1 and Y3 indicate pre-tests; Y2 and Y4 indicate post-tests; P refers to experimental treatment (adopting interactive system instruction); and T refers control treatment (traditional instruction only).

RESULTS

Two between-subject one-way univariate analyses of covariance (ANCOVA) at the 0.05 significance level were administered to evaluate the effect of the treatment on the students' reading and listening achievements. In the analyses, the students' scores in the post-tests (listening and reading tests) were the dependent variables for the two ANCOVA tests. In both ANOCOVA tests, the students' scores on the pre-tests were used as the covariate to reduce the error variance and biased estimations caused by different possible subjects' English proficiency levels between the control and treatment groups, which could not be reduced using the experimental controls.

LISTENING TEST

As in most educational research, this had a quasi-experimental design. Although the ANCOVA test was robust as to the assumption violation, it was important to test the three important assumptions for the ANOCOVA due to the unequal sample size of the control group and experimental group in this study. The Q-Q plot, Levene's Test of Equality of Error Variances and the GLM procedure were performed to test the normal distribution, homogeneity of variance and homogeneity of the covariate regression coefficients assumptions, respectively. From the test results listed in Tables 4 and 5, it can be concluded that all three assumptions are tenable. The data was ready for the ANCOVA procedure. Figure 2 shows the test of the normal distribution assumptions.

Table 4: The means and standard deviations of the subjects' pre-test results.

Group	n	Pre-test	
		Mean	SD
Control	81	73.65	24.55
Experimental	67	79.55	17.69

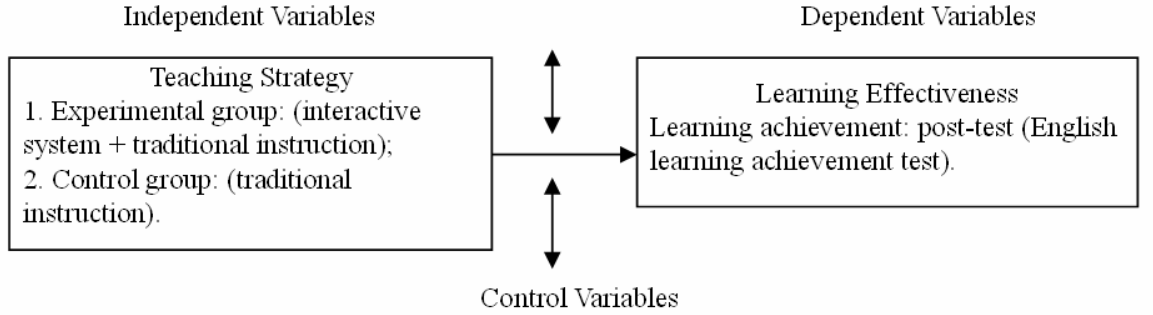
Table 5: The means and standard deviations of the subjects' post-test results.

Group	n	Post-test	
		Mean	SD
Control	81	72.56	25.14
Experimental	67	83.51	16.48

Table 6: Estimates of the marginal means.

Group	n	Post-test	
		Mean	SE
Control	81	75.27	1.48
Experimental	67	80.24	1.63

Covariates appearing in this model were evaluated at the value for the pre-test equalling 76.4358.



Students' Basic Ability	Teachers' Professional Ability	Teaching Materials
1. First grade basic ability; 2. Computer skills.	1. Teaching experience; 2. Professional ability; 3. Computer skills; 4. Teaching service (2-3 yrs).	1. Textbook; 2. Materials set by teacher; 3. Web resources.

Figure 1: The list of variables.

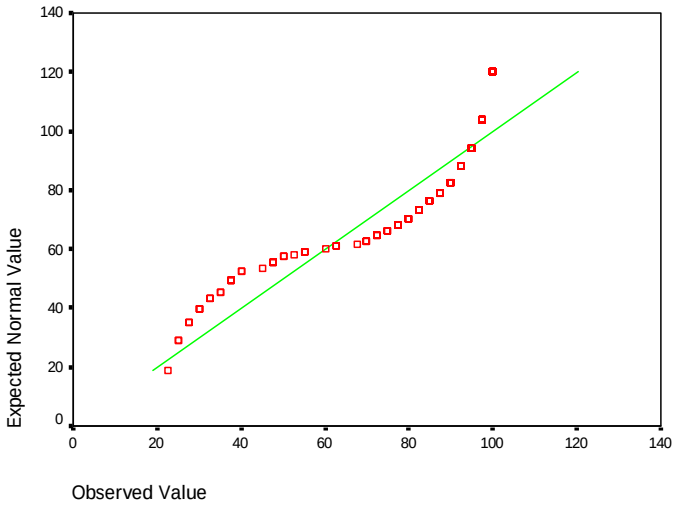


Figure 2: The test of the normal distribution assumptions.

The results of the ANCOVA test showed that there were statistically significant differences in the students' performance in the listening post-tests between the control and experimental groups after adjusting for the covariate with F (1, 145) = 5.011, p<0.05 with the observed power of 0.60 and the 0.033 partial eta squared. With the estimated marginal means of 80.24 and 75.27, respectively, one can conclude that subjects in the experimental groups performed significantly better on the listening post-test than those in the control group.

READING TEST

The means and standard deviations of the two groups' pre-test and post-test results are shown in Tables 7 and 8, while the estimates of the marginal means are listed in Table 9.

Table 7: The means and standard deviations of the subjects' pre-test results.

Group	n	Pre-test	
		M	*SD*
Control	81	67.59	20.13
Experimental	87	66.22	21.69

Table 8: The means and standard deviations of the subjects' post-test results.

Group	n	Post-test	
		M	*SD*
Control	81	68.36	22.20
Experimental	87	69.17	23.98

Table 9: Estimates of the marginal means.

Group	N	Post-test	
		M	*SE*
Control	81	67.30	1.16
Experimental	87	70.16	1.12

Covariates appearing in this model are evaluated at the following values: pre-test = 67.2173

For the reading test, the results of the Q-Q plot, Levene's Test of Equality of Error Variances, and the GLM procedure showed no violation of the normal distribution, homogeneity of variance, or homogeneity of the covariate regression coefficients assumptions. From the test results, it can be concluded that all three assumptions are tenable (see Figure 3, and Tables 10 and 11). Table 10 tests the null hypothesis that the error variance of the dependent variables is equal across groups. The results of the ANCOVA showed that there were no statistically significant differences in students' reading performance for the different treatment groups after the adjustment of the covariate with F (1, 165) = 3.172, p<0.05.

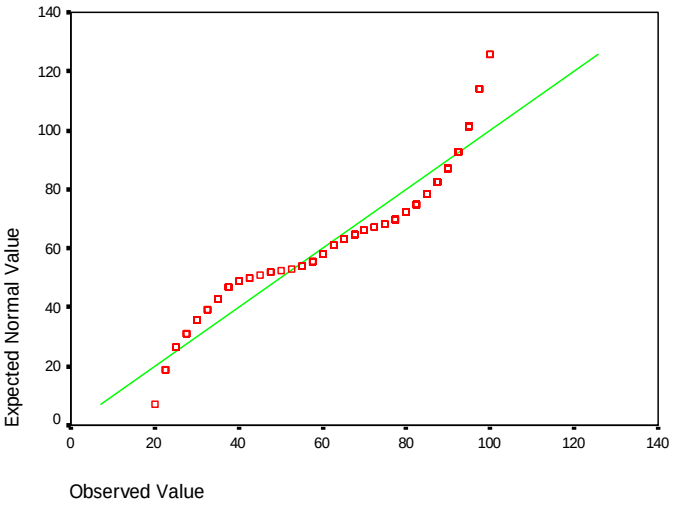


Figure 3: The test of the normal distribution assumptions.

Table 10: The test of the homogeneity of the variance assumptions.

F	df1	df2	Sig.
2.285	1	166	0.133

Table 11: The test of the homogeneity of the covariate regression coefficients.

Source of Variation	SS	Df	*MS*	*F*
Group	43.520	1	43.520	0.404
Pre-test	69478.605	1	69478.605	645.140*
Group* Pre-test	159.574	1	159.574	1.482
Within Cell	17662.048	164	107.695	
Total	883625.000	167		

*p<0.05

DISCUSSION

This study was a quasi-experimental study to investigate the facilitating effects of online interactive learning systems on students' performance in English listening and reading while using subjects' English proficiency levels as covariates. Two ANCOVA tests were performed to test the research hypotheses. The ANCOVA test failed to reject the null hypothesis in the reading tests – it seems that the treatment could not elicit subjects' performance differences in their reading comprehension. The ANCOVA results showed that the students receiving the treatment performed better than those who did not receive the treatment in terms of their performance in listening with a 0.033 partial eta squared – the different teaching methods after adjustment of subjects' English proficiency level accounted for about 3.3% variance in their performance in the listening comprehension with 0.60 power. However, from the ANCOVA listening tests, it can be seen that the observed power for the test on the subjects'

performance was only 0.60, which did not reach the expected observed power.

As in much other research, this study provided evidence that Web-based interactive learning systems can effectively enhance students' English listening skills, even though the low observed power reduced the generalisability of the study. On the other hand, different from many other studies, this research failed to offer the evidence that Web-based interactive learning systems can enhance students' English reading abilities. From this study's results, it seems that the treatment could help students' with their English listening but it could not bring about different students' achievements from traditional teaching methods.

After estimating the value of the interactive learning system, the online courses should also be evaluated, and it is important to look at how the language course is being taught. As an online course designer, one must consider e-course objectives, the e-content, e-policies and e-procedures. Firstly, the e-programmes need to assess the needs of the learners and to consider the necessary conditions needed to satisfy them. The course designer should ask: Does the curriculum meet the learners' needs? Can it help promote language learning efficiency? Secondly, materials should be interesting, authentic and offer content that is relevant to all participants. Without immediate access to a teacher's book or student workbook, it is important that students can download materials for practice. Thirdly, the e-teacher should consider the teaching procedures and how to present the teaching content. Fourthly, it should be ensured that e-assessment can exactly estimate the learning efficiency. Finally, the practitioner needs to maintain and update the information of the interactive system [6].

Apart from the considerations listed above, teachers must take into consideration many different factors, including issues such as the motivation of the learners, cultural backgrounds, language backgrounds and different methodologies that can and cannot be used electronically.

LIMITATIONS AND SUGGESTIONS

This research presented in this article has several limitations. First, although the two teachers' professions were similar, the student achievement scores for the post-test might have been affected due to differences in the teachers' professions. This research might have been improved if the six classes had been taught by the same teacher – or at least if the two different teachers had fully communicated with each other in advance. Second, the number of students in the listening and reading sessions should be exactly the same because students should take both the reading and listening parts at the same time, both for the pre-test and post-test. In other words, every test that students took included both reading and listening sections. In this study, the number of students for reading and listening sessions were different due to some missing data. The study would have been better if the researchers had paid more attention to data collection procedures.

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