

Using NETPAW to advance senior high school students' English acquisition in the context of the Common European Framework

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ABSTRACT: The purpose of this research is to understand students' learning processes, effectiveness and attitudes via an online interactive English learning system created by the National English Test in Proficiency for All on the Web (NETPAW) testing centre of the Republic of China Multimedia English Language Instruction Association (ROCMELIA). NETPAW generated a reciprocal table of the Common European Framework and had it published on the ROCMELIA Web site, as required by the Taiwanese Ministry of Education. The Common European Framework has also been adopted by international English tests such as TOEFL, TOEIC and Cambridge English Tests. This study adopted a quasi-experimental research design, with 217 eighth grade students from central Taiwan participating in the study. The results show that students who learnt English via the interactive learning system online and traditional teaching methods performed better than those students who learnt English via traditional teaching methods only. The study also found that the interactive learning system could not only motivate students to learn English better, but also enhance students' listening and reading proficiency. The results suggest that the online Web-based interactive 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 global community. Brown observed that *learning a second language is a long and complex undertaking* [1]. As in other areas of Asia, English is used as a foreign language in Taiwan. In Taiwan, many people strive to acquire a good English education at 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 [2].

Whether a student is successful in learning a foreign language is determined by many factors. Theoretically, foreign language learners can learn a foreign language well on the condition that they are provided with a good language learning environment, plenty of study time, strong motivation, effective teaching and learning methods, strategies, enough teaching materials plus a thoughtful teacher who knows the learners' needs [3-7].

There are many reports about the effective use of Internet technologies, Web resources and multimedia learning programmes in English as a Second Language (ESL) and English as a Foreign Language (EFL). In Taiwan, English is not an official second language. Nevertheless, the entire student population of Taiwan is now engaged in an island-wide struggle to master English.

The nature of language makes technology-enhanced language learning an optimal instructional medium because language learning requires lots of practice and interaction [8]. 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 [9-12].

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, such as conversations with English teachers and peers, reading newspapers, listening to radio programmes, audio tapes, CDs, watching television programmes, movies, video tapes, DVDs, and studying language programmes with multimedia, hypermedia and the Internet [4][13-16].

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 [17][18]. 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 [19].

When 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, authentic learning context [20-28]. Thus, the traditional classroom must make way for the virtual classroom, and traditional learning must give way to cyber-learning or e-learning, with electronic testing or e-assessment replacing 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 [29].

In a study of the effectiveness of using New Horizon College English Online (NHCE) of an online EFL course management and learning system, Da stated that by using the interactive system, an instructor can reduce the classroom time normally devoted to reading and listening instruction, and pay more attention to speaking and writing skills [29]. Such a 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 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 processes 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 originated 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 divided human knowledge into three levels: *recognition*, *understanding* and *mastery* [30]. 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 [4]. Theories and approaches related to this research are elaborated on below.

Fun, Efficiency and Association Theories (FEAT)

There are three important theories behind efficient language learning. Chuang proposed three theories behind efficient language learning, specifically: Fun, Efficiency and Association Theories (FEAT) [31][32]. This research proved that these theories are useful for language teachers to use to teach their students.

The Theory of Fun promotes 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 that can contribute to making language learning more fun: stories/jokes (whether in narrative or dramatic form), ingenuity and multimedia.

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

The Theory of Association is to make language learners easily remember what they have learnt. 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.

Sociocultural Constructivist Approach

The theories of Dewey, Vygotsky and Leont'ev emphasise interpersonal, experiential and process-oriented learning have increasingly influenced people in the field of education [30][33][34]. 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. And 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 are motivated for literacy learning, and they will have the best chance of achieving such a full degree of communicative competence as to discuss and learn language and literacy skills [30].

In other words, sociocultural constructivism emphasises engaging learners in problem solving, and situational and cooperative learning. The advent of multimedia computer and Web-based technologies have made this shift more attractive although not unproblematic in implementation [35-37].

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 [38][39]. This behaviourist approach regards *learning as predominantly concerned with information processing* [40].

Complementary Approaches

While educators have quite different approaches to teaching students, do behaviourist approaches and Web-based constructivism contradict each other? Borrowing a statement from Felix, a clearer view can be obtained whereby they complement each other [4][40]. Felix stated:

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 [40].

NETPAW EFFORTS

The Importance of NETPAW in Taiwan

English has been playing an increasingly significant role in international trade, tourism and telecommunications in Taiwan. Enhancing English proficiency has been gathering more and more momentum. As in many other countries, English is used as the most important foreign language in Taiwan. Increasing numbers of both business people and students are trying their best to gain a good command of English. This is paralleled by the efforts of the Taiwanese Government to expand and strengthen opportunities and resources for English learning, including support for purchasing computers, building the Internet infrastructure and developing multimedia English courseware on the Web.

A baseline for proficiency improvement can be established by national testing. The Taiwanese Ministry of Education understands the importance of online testing. Therefore, they initiated the National English Test in Proficiency for All on the Web (NETPAW) in Taiwan based on the E-era Manpower Development Project, one of 10 projects under Challenge Year 2008 – Important Projects for National Development. The Ministry provided a grant to the Republic of China Multimedia English Language Instruction Association (ROCMELIA) to design online English proficiency tests with the project of NETPAW.

The integration of testing with online computing makes the integration of testing and instruction both easier and more efficient. ROCMELIA, the multimedia English learning and instruction association in Taiwan, offered five national English listening and reading proficiency tests on the World Wide Web before NETPAW, and started to offer the first NETPAW on 6 November 2004. There have been three first-stage and three second-stage tests held so far. The first-stage test consists of listening and reading tests, while the second-stage test includes speaking and writing tests.

The Ministry of Education also supports the potential and current efforts for computer-assisted English testing. In March 2002, the Ministry of Education drafted a call for proposals in which any institute in Taiwan could submit a proposal to build the national English proficiency test on the Web for Taiwan. ROCMELIA obtained a grant. This means that ROCMELIA has to shoulder the responsibility to offer more professional English proficiency tests to people in Taiwan. Their plan is to offer tests in all the four language skills of listening, reading, speaking and writing. For the NETPAW test, there are already five levels of proficiency tests created, namely:

- Beginner;
- Basic;
- Low-intermediate;
- Intermediate;
- High-intermediate.

The advanced and professional levels will be added to the NETPAW test in the near future.

Language instruction consists mainly of the following three components:

- Teaching materials;
- Teaching methods;
- Language acquisition evaluation.

The first two are closely related to language acquisition. Language acquisition evaluation is indispensable for measuring language acquisition. The WWW provides an excellent platform for language acquisition evaluation. It is special in that it can provide multimedia and hypermedia, allowing teachers and students to instruct and learn the target language in a non-linear and creative manner. It helps promote instruction because of its immediate, international and integrative features. Moreover, there is no paper needed for online testing, which contributes to the protection of the environment.

As Web tests enjoy so many advantages, ROCMELIA decided to offer NETPAW in June 2000 for the first time. It has held five national tests. Based on the experiences gained from these five national English proficiency tests, the authors elaborate on NETPAW's purposes below, and illustrate initial statistical analyses in areas such as testing specialties, expected results, testing procedures, testing areas, different abilities, levelling guidelines and the analysis of proficiency tests.

The Purposes of NETPAW

The Government of Taiwan is directing its support to the Policy of Manpower Development and the Policy of Continuing Education for All People. NETPAW is one of the key projects for this workforce development movement.

There are several purposes in offering NETPAW as follows:

- Promoting online English learning for all people;
- Making education and life interesting, informational and international with multimedia;
- Protecting trees from being cut down with the use of paperless tests;
- Saving time due to immediate feedback on students' test results generated by the computer;
- Improving all people's English abilities;
- Enhancing Taiwan's competitiveness in the world.

Testing Specialties

NETPAW is of great importance for Taiwan's future. It will be easier to understand this matter from the following points of view concerning NETPAW:

- NETPAW was designed based on three educational principles, namely: step by step, proactive participation and student-centred;
- NETPAW was created with the three FEAT learning theories in mind, that is fun, efficiency and association theories;
- NETPAW is environmentally friendly since it is digital, can be reused and does not utilise paper;
- NETPAW is a fair test since it was initiated and funded by the Ministry of Education and created by great scholars from Taiwan and abroad. It is also impossible for those being tested to cheat in the test because of the random mechanism in distributing the test questions;
- NETPAW saves a lot of money because it uses existing computers and infrastructure, integrates existing resources

and labour, and is run by a non-profit academic organisation;

- NETPAW is outstanding because it also provides faster access to knowledge through the Internet, hence the quality is better with computing assistance and management, and it shrinks the city-country differences regarding access to information.

Expected Results

The following results are expected:

- NETPAW can be used to increase the application of a computer multimedia network;
- NETPAW can be utilised to provide good and effective English learning materials;
- NETPAW can be used to examine the effectiveness of English instruction and enhance English instruction;
- All people can test their own English abilities on the Web and apply it by interacting with their family members;
- All people can attend the All People English College on the Web to enjoy learning English, and can ask questions of scholars from around the world;
- All people can improve their English abilities interestingly and effectively.

Testing Procedures

Testing and Learning Centres and Seats

There will be at least one English test and learning centre for each county or city. The final goal will be that each school has their own English test and learning centre. Therefore, students do not need to go outside of their schools to take the NETPAW test [41].

Two weeks before a test, the testing centres and seats are broadcast on ROCMELIA's Web site [42].

Scoring

Computer programs are used to score the listening and reading tests, and the scoring for speaking and writing tests is assisted by computers. The use of computer scoring for speaking and writing tests is planned for the near future.

Test Scores and Certificates

The grade scale is 100. The passing score is 70 for the first stage and 75 for the second stage. All people who take the test receive their scores. A certificate is given to those who pass all four language ability tests.

Testing Areas

Listening Comprehension Test

The contents for the beginner, basic and low-intermediate levels are mainly related to daily life. The intermediate and high-intermediate levels include more abstract content. The difficulty increases as the testing level goes up.

Figure 1 shows a listening test question at the beginner level. The student will hear: *talking about a picture*.

Figure 2 presents a listening test question at the basic level where the student hears three options: (A) *I can see two zebras*; (B) *I can see two horses*; and (C) *I can see two elephants*.

Figure 3 shows a listening test question at the low-intermediate level. The student hears: *Look at the two pictures on the left. How much is a clock?* (A) *It's \$75*; (B) *It's \$20*; (C) *It's \$200*.



Figure 1: A listening test question at the beginner level.



Figure 2: A listening test question at the basic level.

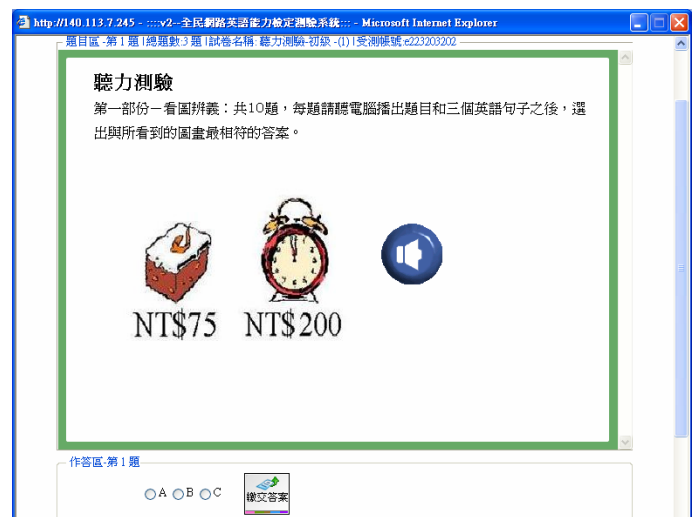


Figure 3: A listening test question at the low-intermediate level.

Figure 4 shows a listening test question at the intermediate level where the student hears: *Look at the picture on the left. Which statement is true? (A) The second is larger than the first. (B) The third is larger than the first. (C) The first is larger than the second. (D) The second is larger than the third.*



Figure 4: A listening test question at the intermediate level.

Figure 5 presents a listening test question at the high-intermediate level. The student hears: *Mike: Why do you think God allows evil to exist on Earth? Alice: Well, many people have asked that question, and they have different opinions. Mike: Yes, but what do you think? Question: What are Mike and Alice discussing?*

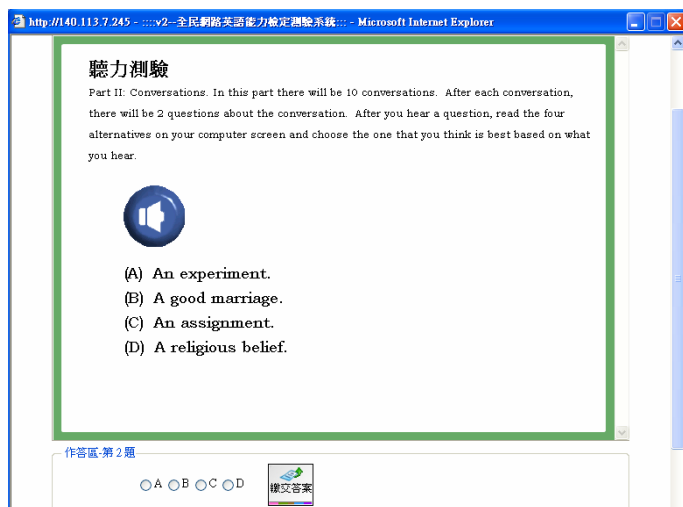


Figure 5: A listening test question at the high-intermediate level.

Reading Comprehension Test

Like the listening comprehension tests, the contents of the reading comprehension test at the beginner, basic and low-intermediate levels are mainly related to daily life. The intermediate and high-intermediate levels include more abstract content. The difficulty increases as the testing level goes up.

Speaking and Writing Tests

A person taking these tests can take them after they have passed both the listening and reading tests. They have to pass

both the speaking and writing tests so that they can obtain a certificate to show their English proficiency at this level. Figure 6 presents a speaking test question at the high-intermediate level, while Figure 7 shows a writing test question at the high-intermediate level.

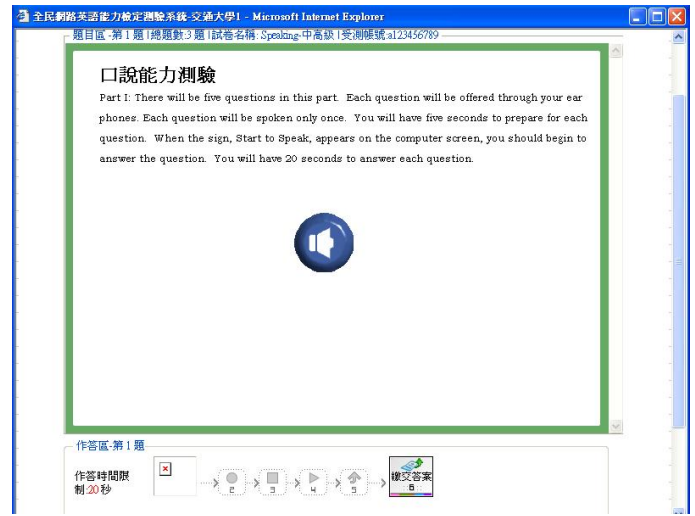


Figure 6: A speaking test question at the high-intermediate level.

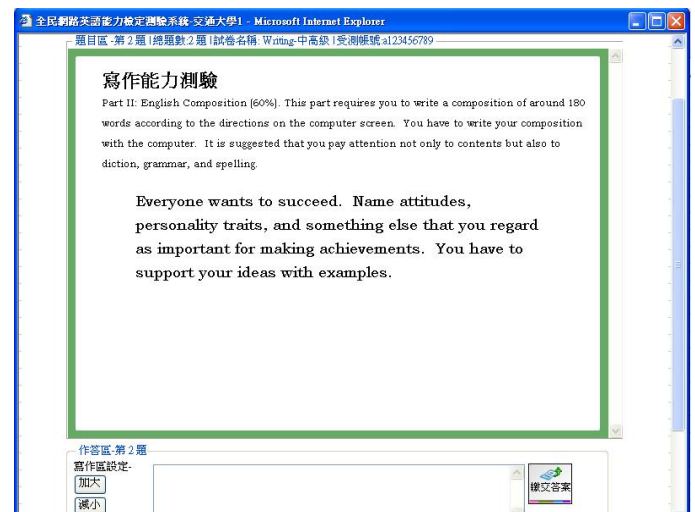


Figure 7: A writing test question at the high-intermediate level.

Test Questions

The NETPAW tests are criterion-referenced. The writers of the NETPAW test question use predetermined criteria to achieve this. A person taking one of the NETPAW tests knows what the standards are for passing by reading the NETPAW Manual or online descriptions. The student competes against nobody else but himself/herself. Therefore, it should be interesting and important to state what criteria are being utilised for the NETPAW test questions.

As mentioned previously, there are five proficiency levels for the first NETPAW tests: beginner, basic, low-intermediate, intermediate and high-intermediate. Each proficiency level uses a graded wordlist. The beginner level uses the ROCMELIA 500 wordlist, the basic level uses the Ministry of Education's 1,000 wordlist, the low-intermediate level uses the ROCMELIA's 2,500 wordlist, the intermediate level uses the ROCMELIA 5,000 wordlist and the high-intermediate level uses the CEEC 6,480 wordlist.

Apart from the wordlists, other criteria are also utilised to grade the NETPAW tests such as grammar, information loading and concept abstractness. For example, questions related to propositions can be divided into different groups based on difficulty. The proposition in 1a is easier than that in 1b – not only because it is used more often, but also because its concept is more concrete. The two are as follows:

- 1a. He lives in this house.
- 1b. Taiwan is known for its electronic products.

Dialogue 2a is more difficult than Dialogue 2b since it uses complex words and its information loading is heavier as follows:

- 2a. (Listen):
Tom: Where do you come from?
Mary: I come from Taiwan.
(Read):
Question: Where does the girl come from?
(A) Taiwan.
(B) Japan.
(C) Korea.

- 2b. (Listen):
Tom: Good morning, Mary.
Mary: Good morning, Tom.
Could you help me with this math question?
Tom: It's my pleasure. We are classmates.
(Read):
Question: What did they talk about?
(A) Tom was a teacher.
(B) Mary was a teacher.
(C) Mary asked for help.

The NETPAW-CEF Reciprocal Table

The Common European Framework (CEF) has been adopted by the Ministry of Education in Taiwan and international test institutes such as the ETS and Cambridge [43]. The Ministry of Education stipulated that each testing institute should have their reciprocal table as presented in Table 1 that has been published on the Internet. The NETPAW-CEF table has already been published on the ROCMELIA Web site [44]. It indicates that the NETPAW basic, low-intermediate, intermediate and high-intermediate levels are equivalent to the A1, A2, B1 and B2 levels of the CEF, respectively.

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, and reconstruct arguments and accounts in a coherent presentation. Can express himself/herself spontaneously very fluently and precisely and differentiate finer shades of meaning even in more complex situations	N/A
	C1 Effective Operational Proficiency	Can understand a wide range of demanding and longer texts, and recognise implicit meanings. 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 and detailed text on complex subjects, showing a 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 a 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 while travelling in an area where the language is spoken. Can produce and 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 areas 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 the aspects of his/her background, immediate environment and matters in areas 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

Research Purposes and Questions

The purposes of this study involved constructing an online interactive learning system, investigating how Web-based interactive learning systems affect eighth graders' learning achievements, as well as attitudes, and providing suggestions for eighth grade English teachers. Two research questions were raised based on the following research purposes:

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

The following two null hypotheses were proposed based on the above research questions:

- Online interactive learning systems have no statistically significant effect on junior high school students' listening ability;
- Online interactive learning systems have no statistically significant effect on junior high school students' reading ability.

Research Design and Procedure

The study utilised a quasi-experimental research design. The participants were 217 eighth grade students (comprising six classes) in a senior high school of Yunlin County in Taiwan. The researcher selected two high academic proficiency classes, two middle academic proficiency classes, and two low academic proficiency classes from the whole eighth grade level of students. The researchers divided these six classes into 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 used in this study referred to Web sites offered by the instructors that students could access on their own – whether in class or at home. Thus, the Web sites could be visited in the multimedia laboratory of Mia-liao Senior High School.

The experimental group received instruction that combined both traditional instruction and that via online interactive learning systems. The control group received traditional English instruction only. The instruction period of 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 of the test was 0.931 for the basic listening test and 0.783 for the basic reading test. 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 and were professionally similar. Tables 2 and 3 represent the research design.

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 the experimental treatment (adopting the interactive system instruction); and T refers the control treatment (traditional instruction only).

Figure 8 presents the independent and dependent variables, as well as the control variables.

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.

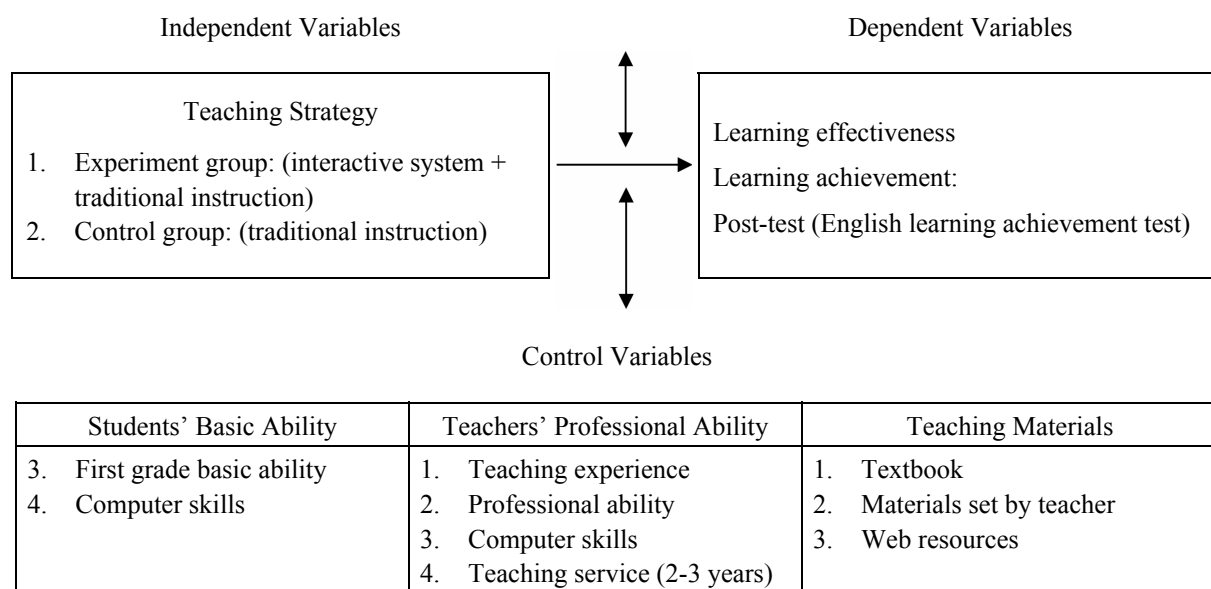


Figure 8: The list of variables.

The two English teachers had a teaching certificate. They both had majored in English at the university level and had at least two to three years of teaching experience.

Teaching Materials

Besides the normal English teaching materials, the two English teachers also adapted useful materials from the Web from the ROCMELIA NETPAW site and Live ABC site [42][45].

RESULTS

Two between-subject one-way univariate analyses of covariance (ANCOVA) at the 0.05 significance level were administered in order to evaluate the effects 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, 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

Table 4 lists the means and standard deviations of subjects' pre-test and post-test scores while Table 5 shows the estimates of the marginal means with regard to the 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 the homogeneity of covariate regression coefficients assumptions, respectively. From the test results, one can conclude that all three assumptions were tenable (Figure 9, and Tables 6 and 7). The data was ready for the ANCOVA procedure.

The results of the ANCOVA 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 0.600 and the 0.033 partial eta squared (Table 8). With the estimated marginal means of 80.24 and 75.27, respectively (Table 5), it can be concluded that subjects in the experimental groups performed significantly better on the listening post-test than those in the control group.

Table 4: Means and standard deviations of the subjects' pre-test and post-test scores.

Group	n	Pre-Test		Post-Test	
		M	M	SD	SD
Control	81	73.65	72.56	25.14	24.55
Experiment	67	79.55	83.51	16.48	17.69

Table 5: Estimates of the marginal means.

Group	n	Post-Test	
		M	SE
Control	81	75.27	1.48
Experimental	67	80.24	1.63

Note: covariates appearing in this model were evaluated at the value of pre-test = 76.4358.

Normal Q-Q Plot of posttest

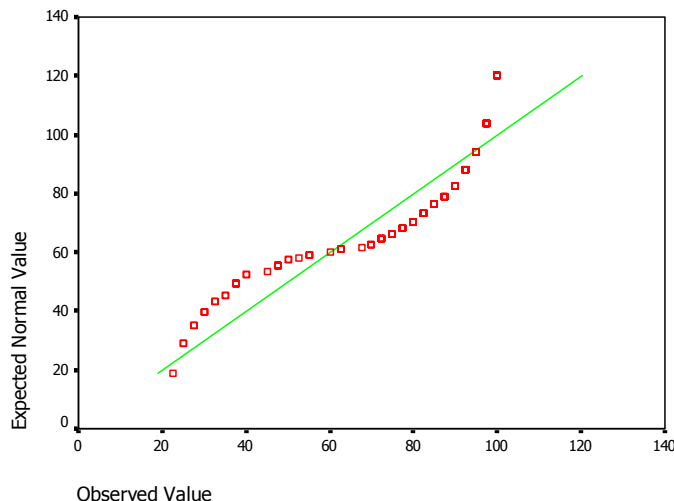


Figure 9: Test of normal distribution assumptions.

Table 6: Test of the homogeneity of variance assumptions using Levene's Test of Equality of Error Variances where the dependent variable is the post-test.

F	df1	df2	Sig.
1.040	1	146	0.310

Table 7: Test of the homogeneity of covariate regression coefficients showing the tests of between-subjects effects where the dependent variable is the post-test.

Source of Variation	SS	df	MS	F
Group	628.657	1	628.657	3.601
Pre-test	27,275.450	1	27,275.450	156.237*
Group*Pre-test	354.411	1	354.411	2.030
Within cell	25,139.176	144	174.578	
Total	72,893.708	148		

* $p < 0.05$

Reading Test

Table 9 shows the means and standard deviations of the subjects' post-tests, while Table 10 lists the estimates of the marginal means. 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 covariate regression coefficients assumptions.

From the test results, it can be concluded that all three assumptions were tenable (Figure 10, and Tables 11 and 12). 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 $F(1, 165) = 3.172$, $p < 0.05$ (Table 13).

Table 8: ANCOVA results.

Source	SS	df	MS	F	Partial Eta Squared	Observed Power
Between groups, A_{adj}	880.959	1	880.959	5.011*	0.033	0.600
Within groups, S_{adj}	25,493.586	145	1,753,818			
Total $_{adj}$	26,374.545	146				

* $p < 0.05$

Table 9: Means and standard deviations of the subjects' post-test scores.

Group	n	Pre-Test		Post-Test	
		M	M	SD	SD
Control	81	67.59	68.36	22.20	20.13
Experimental	87	66.22	69.17	23.98	21.69

Table 10: Estimates of the marginal means.

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

Note: covariates appearing in this model were evaluated at the value of pre-test = 67.2173.

Table 12: Test of the homogeneity of covariate regression coefficients for the tests of between-subjects effects where the dependent variable is the post-test.

Source of Variation	SS	df	MS	F
Group	43.520	1	43.520	0.404
Pre-test	69,478.605	1	69,478.605	645.140*
Group*Pre-test	159.574	1	159.574	1.482
Within Cell	17,662.048	164	107.695	
Total	883,625.000	167		

* $p < 0.05$

DISCUSSION

This study used a quasi-experimental design to investigate the facilitating effects of online interactive learning systems on students' performance in English listening and reading while using the 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 those students who received 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 the adjustment of the subjects' English proficiency level accounted for about 3.3% variance in their performance in the listening comprehension test 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 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 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 could not bring about different

Normal Q-Q Plot of POSTTEST

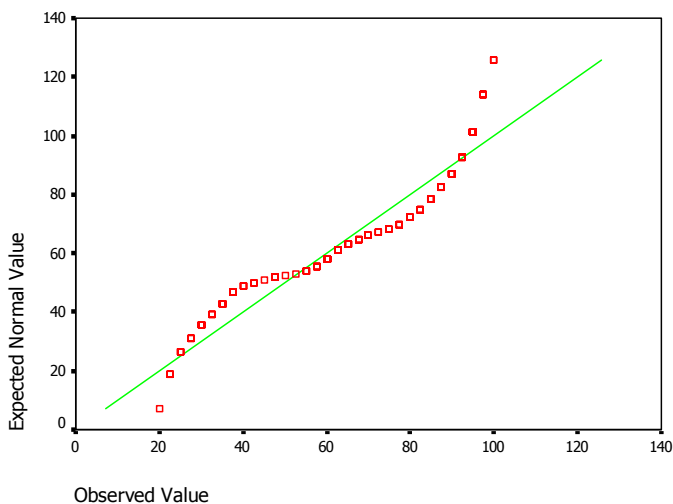


Figure 10: Test of normal distribution assumptions.

Table 11: Test of homogeneity of variance assumptions using Levene's Test of Equality of Error Variances where the dependent variable is the post-test.

F	df1	df2	Sig.
2.285	1	166	0.133

Table 13: ANCOVA results.

Source	SS	df	MS	F	Partial Eta Squared	Observed Power
Between groups, A_{adj}	342.644	1	342.644	3.172*	0.019	0.42
Within groups, S_{adj}	17821.621	165	108.010			
Total $_{adj}$	26374.545	166				

* $p < 0.05$

students' reading achievements compared to 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, as well as the e-content, e-policies and e-procedures. First, in e-programmes, there is a need to assess the requirements of learners and consider the necessary conditions needed to satisfy them. The course designer needs to consider a few questions: does the curriculum meet learners' needs? Can it help promote language learning efficiency? Secondly, materials should be interesting, authentic and offer content relevant to all participants. Without immediate access to a teacher's books or student workbooks, 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 needs to be ensured that e-assessment can exactly estimate learning efficiency. Finally, the practitioner needs to maintain and update the information of the interactive system [19].

Besides the considerations above, teachers must take into consideration many different factors including issues such as learners' motivations, cultural backgrounds, language backgrounds and different methodologies that can or cannot be used in education supported by electronic means.

CONCLUSION

This research focused on the English learning effectiveness of an online English learning system for eighth grade students. It was found that the online English system of NETPAW was effective for improving students' English ability. There are several suggestions for further researches. First, a more precise design with the Common European Framework should be undertaken for further research. Second, speaking and writing skills can be also included in future research.

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11th Baltic Region Seminar on Engineering Education: Seminar Proceedings

edited by Zenon J. Pudlowski

The yearly *11th Baltic Region Seminar on Engineering Education* was organised by the UNESCO International Centre for Engineering Education (UICEE) and held Tallinn, Estonia, between 18 and 20 June 2007. The Seminar attracted participants from 10 countries worldwide. Almost 40 papers have been published in this Volume of Proceedings, which grossly document and present academic contributions to the Seminar. All of these published papers present a diverse scope of important issues that currently affect on engineering and technology education locally, regionally and internationally.

The principal objective of this Seminar was to bring together educators from the Baltic Region to continue dialogue about common problems in engineering and technology education under the umbrella of the UICEE. To consider and debate the impact of globalisation on engineering and technology education within the context of the recent economic changes in the Baltic Region, as well as in relation to the strong revival of the sea economy. Moreover, the other important objectives were to discuss the need for innovation and entrepreneurship in engineering and technology education, and to establish new links and foster existing contacts, collaboration and friendships already established in the region through the leadership of the UICEE.

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