

Enhancing Listening Proficiency via Multi-Modality Technology: A Study with Technology University Non-English Major EFL Learners in Central Taiwan

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ABSTRACT

This study concerns a multi-modality technology (MMT) intervention in a non-English major English as a foreign language (EFL) Listening and Speaking class (LS). Learners' progress was measured as they used the Interactive Response System (IRS) test practice instrument in class, and Pronunciation Power (PP), Active Reading (AR), and Sounds Good (SG) eLearning programs in the self-access center. A mixed method approach was adopted for data collection, and paradata such as students' PP learning log and SG unit reports were collected along with exam scores and attitude ratings, for triangulation purposes. A total of 207 students from three majors participated in the first study, and 138 students in a second study. Positive attitudes were detected from the satisfaction survey and corresponding improvements were recorded in exam grades. A significant difference in IRS satisfaction and exam results was identified among our three target groups with different majors, and effort put into eLearning practice in the self access center was observed to be a potential contributor to the distinction. The interpretation and pedagogical significance are discussed.

Keywords: IRS Test Practice, Multi-modality Technology, Listening Proficiency, Non-English Major EFL Learners.

1. INTRODUCTION

The lack of English proficiency in technology universities in Taiwan was demonstrated by a series of three annual national assessments, starting in 2001. The Language Training and Testing Center (LTTC) in Taipei was entrusted by the Ministry of Education (MOE) with the task of conducting a nationwide assessment using the General English Proficiency Test (GEPT) elementary level threshold. The reported pass rates in the elementary GEPT at 58 technology universities were only 1.123%, 1.416% and 2.026% [17]. In reference to the Common European Framework of Reference (CEFR), the elementary level of GEPT is equivalent to the Key English Test (KET) level of the Cambridge Main Suite, the 115-135 level of the Computer (CBT) TOEFL, the 3.0-4.0 level of IELTS, and 400-450 level of TOEIC. Despite efforts to promote English as a second language in local curricula, seriously low listening proficiency in particular was again diagnosed in the technology universities in 2011 when TOEIC listening results fell behind those of normal universities with mean scores of 248 versus 318 [6].

Yu [19] analyzed the gap between the general and technology university system in Taiwan and attributed the reason to teaching hour discrepancies in the curriculum. Indeed a large gap does exist between the numbers of hours of English taught in these two systems. The former system provides five to six hours of English instruction per week, while the latter only

three to four hours per week. Furthermore, the general universities admit students mainly from general (comprehensive) high schools, but technology university students come mainly from technology (vocational) schools. As a result, the general university system receives students with a better English proficiency compared to the technology system. Besides that, You [18] reported low vocabulary sizes, which often lower Taiwan's technology students' reading and listening ability. It is estimated that Taiwan's technology students' vocabulary is limited to 2,000 high frequency words when normally a minimum of 10,000 vocabulary words are required to become a fluent reader of English textbooks, not to mention that effective listening requires broader rhyme, stress, intonation and pragmatic skills. Furthermore, subtle differences in the meanings of words have never been easy to discriminate for those who are not well-versed in English, especially our EFL learners. The conclusion is the pedagogical dilemma, noted by Chwo, Shih and Tso [4], that the lack of English proficiency on graduation from secondary school has left teachers at the technology colleges inevitably teaching students with a wide range of skill sets and low English proficiencies.

Other factors that might affect listening proficiency have been identified by Chwo [1], who demonstrated the potential English as a Foreign Language (EFL) versus English as a Second Language (ESL) effect with respect to language fluency and accuracy. Chwo observed a generally faster response time of college learners in time-controlled tests in Hong Kong's ESL educational setting compared to the EFL educational setting in Taiwan. Therefore, when designing language practice pedagogy, the speed element should be taken into consideration and an appropriate method should be utilized to enhance processing with speed as well as accuracy.

Given the above results and concerns, reform promoting language proficiency for our technology university EFL learners becomes urgent. Thankfully, with the advance of educational technology and an official mandate from the MOE urging schools to promote eLearning, an opportunity has presented itself to revolutionize educational practice. Indeed, Chwo et al. [4] reported significant progress from a technology university by implementing eLearning as an effective supplementary tool to remediate and promote students' language proficiency. This benefit was also reported by a minority of special needs students.

In order to further explore the feasibility and benefits of the new eLearning pedagogy, we decided in the present study to implement not just one kind of eLearning support but a multi-modality technology (MMT) intervention to see how it can be utilized to promote EFL learners' listening in our non-English major technology university classroom context. In essence we addressed the real time response speed issue mentioned above with the use in class of an Interactive Response System (IRS),

and the vocabulary size and lack of class time issues mentioned above by making available three software packages in the self-access center, as we now describe.

2. IMPLEMENTING MMT IN THE EFL NON-ENGLISH MAJOR CLASSROOM

Listening and Speaking (LS) is a required course for non-English major sophomore students, instructed on a two lesson per week basis in an assigned language lab or classroom. The textbook and teaching package were selected by the teaching staff of the Applied English Department through the voting procedure of the departmental meeting, following presentations by participating publishers. As a result, *Sounds Good* [5] was chosen as the sophomore textbook. The teaching package includes a CD, unit tests and supplementary teaching materials such as PPT and the Sounds Good eLearning program (SG). Standard assessment for the course comprises 20% in-class grading, 20% week 15-16 GEPT listening test, 30% mid and 30% final examination. Speaking proficiency was assessed separately via midterm and final dialogue role play tests providing a scenario for the EFL learners to create their own conversation using the target vocabulary and sentential expressions acquired in the lesson time. Not only can they recycle the vocabulary in a meaningful context, but also act out the scenes that are cross cultural for pragmatic purposes.

The weekly teaching unit follows the guideline of the sophomore coordinator's syllabus. In order to enhance the LS program with MMT, along with the SG support program, the researcher adopted Pronunciation Power (PP) software from the self-access center, the IRS test practice system, and (with one class in the first term only) Active Reading (AR) (see Table 1).

All four of these MMT features were integrated into the LS course in order to remediate and enhance the LS proficiency of our EFL learners. However, IRS is specifically focused on here because of its synchronous nature, simulating the time pressure of real listening, and the fact that it was used during the lesson rather than as outside support.

Vocabulary was pretaught at the beginning of each lesson using prefixes, suffixes or a word scramble game before hearing the listening text. Parts of speech were also introduced to extend students' knowledge about the word family. Vocabulary quizzes on spelling, parts of speech, and L1 translation were given before and after each unit to ensure that the students acquired the basic vocabulary for the target unit content. Movie appreciation during the Easter and Christmas season was also incorporated into the lesson to enrich students' language learning experience with cultural literacy. Afterthought comments were elicited to encourage reflection on the language, and cultural or personal issues inspired by the movie in the language learning context, thus students were exposed to cultural literacy besides vocabulary and language input. Speaking was also practiced along with listening, but our focus here is on the latter.

The novel element in the classroom was the use of IRS to deliver the practice vocabulary and listening comprehension items for each unit (though not for the listening assessment of the course), in place of the usual paper and pencil practice. IRS, sometimes called Classroom Response System (CRS), has been widely used in more than 1,000 universities in U.S.A.

such as Harvard and Brown, but use in Taiwan in class instruction is only in its infancy. Most application is still limited to elementary and junior high school level. Research shows that IRS promotes not only active response and concentration, but also motivation. Significant results have been obtained in biology, chemistry, science, and math learning in Japan and Taiwan [7-16]. Until now, however, the implementation of IRS in language practice at university level has not been attempted as an effective practice tool in the classroom setting [3].

Table 1: Multi-modality technology implemented in the study.

<i>Pronunciation Power (PP)</i>
PP is asynchronous software from English Computerized Learning Inc. of #208, 5405 – 99 th Street, Edmonton, Alberta, Canada T6E 3N8. It contains eight English dictionaries to improve English pronunciation, 120 hours of listening practice, and simulation lessons to enhance learners' stress, timing, articulation, intonation and rhythm (S.T.A.I.R) skills. It also includes 7,000 vocabulary items, thousands of sentence practice items, 100 hours of lesson drills, 2,000 photos and illustrations, and 4 interactive games. It targets elementary and intermediate level learners with 12 ancillary language translations, which include simplified and traditional Chinese characters, French, German, Japanese, Korean, Portuguese, Polish, Russia, Spanish and Vietnamese.
<i>Interactive Response System (IRS)</i>
The IRS system [7-15] is a synchronous interactive response system, which can be used to design time controlled listening and reading practice and tests which elicit a response within a set time. The accuracy rate for each test item, together with individual participant's score is recorded by IRS.
<i>Active Reading (AR)</i>
AR is an asynchronous eLearning program provided by Winhoe publisher Wan Wo Co., Ltd. of 40760, Taichung, Taiwan. It aims to enhance the four language skills with six levels of graded practice lessons and a follow-up practice record tracing function to update instructors with students' recent progress. 50 free accounts were offered for a six month period to try out its effect on learning outcomes. Oral practice and recording are available for students to rehearse their speaking and listening skills besides reading diverse texts.
<i>Sounds Good (SG)</i>
The eLearning program SG is an asynchronous eLearning program provided by the <i>Sounds Good</i> textbook publisher Dong-Hua (aka Tunghua) of No. 77, Section 1, Chongqing South Road, Jhongjheng District, Taipei City, Taiwan. It aims to assist content based listening skills. It serves as a useful extension learning tool after class time and encourages students to review the lesson at their own pace, is non-threatening and has repetitive modality.

To encourage autonomous learning (Chwo [2]) outside of class, an orientation lesson was arranged in the self-access learning center at the beginning of the term to familiarize the students with the software available to enhance their listening, pronunciation and speaking skills. PP was specifically introduced and practiced in pairs under the supervision of the instructor. An individual report was elicited from each student to show what they learnt and how they benefited from PP. The

SG eLearning program which complements the textbook and CD materials has no tracking system available for the instructor to monitor students' practice record, so each practice unit was required to be submitted in print with students' practice note or reflection as part of the homework assessment. Students were encouraged to practice as many times as they wished to remediate their LS skills at their own pace. The purpose of this part of the MMT intervention was to help recycle vocabulary and review lesson content in order to improve listening ability by increasing the frequency of exposure to the relevant listening exercise, its vocabulary, useful phrases and dialogue features. By scaffolding students' LS with MMT to supplement the two lessons per week of in-class instruction, it is hoped that the students are well supported with eLearning opportunities after class time so their LS proficiency can be maximized on an individual basis. Regarding speaking fluency practice, only PP and AR provided a recording function that enables students to practice their intonation, stress and articulation.

The IRS test practice for each unit was based on the textbook CD. The first and second sections are cloze tests of the unit vocabulary definitions and vocabulary comprehension in a sentential context, and the third section is a multiple choice listening comprehension test (no reading text was provided). A teaching assistant was sponsored by the Teaching Resource Center to assist in converting the unit test into IRS format. Different from the traditional paper and pencil test, IRS is a time controlled test where each test item was constrained by a set time and presented in strict sequence. Therefore, students were required to respond to one test item at once within a set time. Several adjustments were made based on the first term's experience to ensure a reasonable time was set for our EFL sophomore learners. An instruction section (with no time limit) was also added to inform students about the format, procedure and the number of items in each practice test so students would be well prepared to respond.

Each time IRS was used, following the students hearing the listening text of the current unit played once on CD, the instructor firstly allocated a remote control to each individual student according to their student number and waited for the whole class to get ready before she started to run the IRS test practice. After the IRS practice, the instructor displayed the results of IRS to the class showing the accuracy rate of each learner. Percentage accuracy for each practice item was also presented in a bar chart to inform students of the difficulty level of each item for the class overall. The instructor emphasized to the class that IRS test practice would not count towards their grade but constituted practice to improve their listening speed and accuracy. Any student with a higher score was acknowledged and nominated as class tutor to help those struggling in the class.

3. RESEARCH QUESTIONS

- 1) What are the non-English major students' attitudes to IRS test practice implemented in their English LS class?
- 2) Is there any significant difference in preference for use of IRS between three groups with different majors?
- 3) Is there any significant difference between the EFL majors in their mid and final exam results in each term?
- 4) Do students' exam results correlate with their scores on the IRS practice tests?

4. METHODOLOGY

Participants

Three non-English major sophomore classes taking the LS course participated in the first term study: Child Care (CC), Nursing (NN) and Environmental Industry (EI). The second term study included 95 students from the CC and NN class in the IRS practice experiment group, and 43 students from the EI class as the control group. Including only valid surveys with all items answered and those who took part in all IRS test practice units, we have 115 first study IRS surveys, 92 second study IRS surveys, together with 138 IRS practice records in the first study and 95 in the second.

Instruments and Procedure

Three classes received instruction from the same instructor throughout the academic year. In the first term study the IRS system was used in class with all three classes, followed by administration of an anonymized IRS survey designed by the Teaching Resource Center to elicit students' general impression of IRS practice. eLearning practice was promoted in the self-access center using PP and SG with unit homework collected for the latter from all three classes for grading. The AR eLearning program was exclusively used by the EI class in the first term. In the second term, CC and NN were selected as the experimental group (EG) to continue the IRS practice, while EI served as control group (CG) without IRS. Again at the end there was an IRS survey (where we report all responses without excluding repeaters or transfers). Cronbach's Alpha for the first survey is .921 and for the second .903, showing high internal reliability.

Both mid and final exam scores were collected in both terms from all classes so as to be able to gauge the IRS effect that might contribute to our EFL students' language learning outcomes as a result of MMT. Additionally, PP learning logs and SG unit homework reports were also collected to investigate the instructional effect of use of the self-access center besides IRS practice in class. Students were also required to reflect on their learning in a learning log to report their general impression of the practice at the end of the first and second term so that the instructor could be informed of the individual student's preferences concerning the software, and in what way the students were benefiting from its use.

5. RESULTS

Table 2: The means and standard deviations of the satisfaction ratings of each major with the use of IRS in the first term survey.

Item	NN		CC		EI	
	Mean	SD	Mean	SD	Mean	SD
Total	44.42	7.56	46.88	5.27	49.46	6.35
#1	4.14	0.78	4.32	0.52	4.33	0.77
#2	4.10	0.88	4.36	0.68	4.41	0.59
#3	4.14	0.72	4.20	0.59	4.32	0.80
#4	4.04	0.94	4.27	0.69	4.23	0.87
#5	3.98	0.95	4.22	0.74	4.18	0.88
#6	3.92	1.04	4.04	1.13	3.56	1.45
#7	3.84	0.88	4.13	0.76	4.23	0.90
#8	4.12	0.77	4.31	0.67	4.23	0.90
#9	3.90	0.83	4.16	0.77	4.10	0.94
#10	4.06	0.84	4.40	0.54	4.49	0.69
#11	4.14	0.84	4.43	0.73	4.62	0.57

Table 3: The means and standard deviations of the satisfaction ratings of each major with the use of IRS in the second term survey.

Item	NN		CC	
	Mean	SD	Mean	SD
Total	46.13	7.49	42.33	4.87
#1	4.15	0.89	3.91	0.51
#2	4.24	0.79	3.85	0.63
#3	4.20	0.72	3.78	0.59
#4	3.98	0.83	3.76	0.67
#5	4.09	0.84	3.67	0.73
#6	3.98	1.11	4.00	0.82
#7	4.15	0.87	3.65	0.60
#8	4.30	0.96	3.93	0.49
#9	4.11	1.12	3.70	0.70
#10	4.43	1.17	4.04	0.59
#11	4.50	1.22	4.02	0.58

Tables 2 and 3 show that the degree of satisfaction with the use of IRS maintains an average level of 4 on a 5 point scale, indicating an overall high degree of satisfaction with its use from all non-English major learners who used it in our first and second study. Though surveys showed that students considered the purchase of IRS system by the university might be too costly (item 6), students' reported concentration and motivation were not the least affected by this perception. Thus, our first research question was positively answered.

Table 4: ANOVA analysis of the difference in the degree of satisfaction with IRS between the different majors who used it in the first and second term study.

Survey	df	Mean square	F	p	Paired tests
First	2	211.7	4.96	.009	NN<EI
	112	42.7			
Second	1	332.9	8.34	.005	CC<NN
	90	39.9			

As seen in Table 4, a significant difference was found among the three groups in the first term in overall impression of IRS. Scheffe analysis reveals that EI rated IRS significantly higher than NN. Regarding the second survey results, NN was significantly higher than CC (F=8.342, p<0.05). Thus, there are significant differences in our survey outcomes among the three majors (research question 2).

Table 5: Descriptive statistics for the different majors in LS course exam results.

Exam	Major	Mean	SD
First term final	NN	64.04	12.34
	CC	63.28	13.19
	EI	64.63	11.08
Second term mid	NN	58.52	14.23
	CC	76.60	8.30
	EI	72.28	8.58
Second term final	NN	70.17	13.58
	CC	77.47	6.25
	EI	72.14	12.46

Based on Tables 5 and 6, there was no significant difference among the three target groups regarding their first term final

exam results. However, significant differences were found in the second term. Scheffe analysis reveals that CC and EI were significantly higher than NN in their second term mid results while CC was significantly higher than NN in the second term final results. This shows that CC in EG with EI in CG stay as the top groups, while NN in EG remains at the bottom.

Table 6: ANOVA analysis of the difference between the different majors in LS course exam results.

Exam	df	Mean square	F	p	Paired tests
First term final	2	20.7	0.14	.872	
	135	150.5			
Second term mid	2	4222.4	36.11	<.001	NN<CC NN<EI
	135	116.9			
Second term final	2	672.8	5.35	.006	NN<CC
	135	125.8			

Table 7: Difference between NN's and CC's quizzes and exam results in the first and second term.

Exam/quiz	Major	Mean	SD	t	p
First final	NN	63.90	12.90	0.254	.800
	CC	63.17	13.50		
Second mid	NN	59.10	13.26	-7.216	<.001
	CC	76.50	8.02		
Second final	NN	70.10	13.54	-0.411	.682
	CC	71.23	11.40		
unit8	NN	79.68	11.87	3.823	<.001
	CC	66.48	18.89		
unit9	NN	66.46	10.90	4.767	<.001
	CC	51.26	17.47		
unit10	NN	65.68	15.81	3.335	.001
	CC	54.07	15.90		
unit11	NN	66.00	18.71	1.783	.079
	CC	59.76	12.46		
unit12	NN	79.71	10.22	1.369	.175
	CC	75.81	15.28		

According to Table 7, CC's second term midterm exam mean is significantly higher than NN's, though NN'S IRS practice results on units 8, 9 and 10 are significantly higher than CC's. The reason why CC outperformed NN on the exam could be contributed to factors other than IRS practice so the SG eLearning report and PP learning log were explored to examine the cause (research question 3).

Table 8: Correlations between IRS test practice results for units of the course and mid/final exam grades in the first and second term (* = significant at p<.05).

Major	Exam	unit8	unit9	unit10	unit11	unit12
NN with CC	1 st final	0.376*	0.331*	0.447*	0.327*	0.272*
	2 nd mid	0.005	0.010	0.044	-0.017	0.177
	2 nd final	0.129	0.321*	0.343*	0.124	0.282*
NN	1 st final	0.277	0.326*	0.580*	0.159	0.312*
	2 nd mid	0.200	0.472*	0.448*	0.137	0.306
	2 nd final	0.360*	0.498*	0.426*	-0.022	0.362*
CC	1 st final	0.480*	0.391*	0.362*	0.585*	0.251
	2 nd mid	0.143	0.360*	0.313*	0.137	0.303
	2 nd final	0.418*	0.423*	0.281	0.529*	0.419*

Based on Table 8, an IRS practice effect was located among some units' results in relation to the EFL learners' exam outcomes, to a greater extent for final exams. In other words, the correlations support the idea that IRS practice helps a student to do better on the course exams (research question 4).

6. DISCUSSION AND SUGGESTIONS FOR PEDAGOGICAL IMPLEMENTATION

The overall results indicate that our EFL non-English college learners were satisfied with the innovative IRS test practice instrument, as positive results were received from the attitude surveys. Furthermore, there were widespread correlations between performance on IRS practice tests and course final exam scores. These findings attest the success of the intervention.

Further analysis however showed that significant differences in both attitude and performance exist among our three target groups. Here some other factors were found to be at work. First, EI displayed the highest IRS satisfaction results and outperformed NN during the first term. Then, despite in the second term being the control group not benefiting from IRS, they did not perform significantly worse than the experimental group on exam grades in that term. Could it be the case that AR served as an effective supplementary tool for EI, promoting learning alongside IRS practice?

On the other hand, a lower satisfaction rating was found for CC than NN in the second term, but CC obtained higher exam grades. In this case the researcher noticed a marked difference in the SG eLearning reports of CC students and suspected that it might contribute to their learning outcomes besides IRS effect. According to the SG homework, great effort was made by CC students: not only did they write out the whole listening conversation text, but also worked on vocabulary and sentence translation to achieve better comprehension of the text. Summaries of short paragraphs and descriptions of gist also appeared in their homework. Furthermore, some students even consciously monitored their progress with comments such as "I found myself making much more progress than last time!", "I found tremendous benefits by repetitive listening practice from the eLearning program."

Compared to the traditional classroom setting, eLearning appears to serve as an effective tool to provide unlimited interactive and repetitive listening opportunities for our non-English major students providing ample input outside of classroom time. This meets the needs of our EFL students who have very limited chances to speak to foreigners in their daily life or exposure to authentic input compared to ESL countries. It appears that the students benefited tremendously from the eLearning program, which consolidated and maximized their listening proficiency both in class with IRS and after classroom time using PP and SG and (where available) AR.

The effect of eLearning in the framework of MMT can be further investigated and integrated into language programs to scaffold non-English majors' language learning and remediate or upgrade their learning outcomes to achieve global competitiveness. However, factors such as class attendance might also affect the IRS practice routine. According to the instructor's report, different groups of students in the NN class were several times late or absent from the class due to a special meeting with their class mentor even though the

instructor had informed the class mentor about the inconvenience caused by a meeting during her course session. This absentee data was not able to be amended and therefore, IRS data collection was affected by the absentee rate during these periods. This is an unexpected factor that must have affected the outcome of the study.

Further possibilities can also be pointed out prompted by the limitations of this study. Firstly, though the students were satisfied with the IRS provision of immediate feedback on their practice outcome, still there are several further program functions available for exploration, i.e. team competition and elimination tournaments, etc. How to extend the IRS practice to create dynamic and constructive team work or cooperative learning in the classroom setting can be explored. Thus, further experiments should include other IRS functions to promote learning outcomes which may enhance concentration and motivation for language courses either at the individual or cooperative learning level. Secondly, more English courses can be involved in the implementation of MMT to experiment on the feasibility of IRS, together with out of class use of synchronous or asynchronous eLearning programs, so as to enhance and sustain learning. Orientation meetings or training programs can be provided to equip and encourage instructors to implement MMT in their language courses to improve learning outcomes. Support from the school administration is another crucial factor in the successful application of MMT to courses. Only with the assistance of a well-trained teacher assistant delegated from the Teaching Resource Center was the instructor able to integrate the IRS practice system into the course instruction on a regular basis. Further experiments or trials are required to explore MMT in the non-English major LS course, or even extend to other language programs such as reading or writing.

Finally, in a study with a limited number of participants in a technology university, positive feedback was nevertheless received from our three target groups. Though the contrasting groups of majors did not offer straightforward results, with encouraging findings from the survey and exam results, further study should include the IRS system and related eLearning programs to confirm the effectiveness of MMT in the overall language learning program so that significant benefits can be identified for the promotion of the English proficiency of technology university non-English major learners.

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