Application of Interactive Whiteboard on Remedial Instruction for EFL Low Achievers

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Abstract

The purpose of this research is to explore the effect of the application of interactive whiteboard (IWB) on EFL fourth graders' remedial instruction by examining their English performance and learning attitude and confidence. A quasi-experimental method was employed in the present study. Participants were twenty low-achieving fourth graders in English subject. The remedial instruction was implemented for eight weeks. A proficiency test and a survey questionnaire were administered before and after the instruction. The findings indicated that (1) after receiving the remedial instruction with IWB, students made significant improvement in English reading and speaking; (2) comparing with the control group, students instructed with IWB showed better attitude and higher confidence in English learning.

Key words: Interactive Whiteboard, EFL, English learning.

Introduction

In Taiwan some researchers try to integrate multimedia programs into elementary English teaching (Chuang, & Shih, 2009; Huang, 2004). The integration of information and communication technology (ICT) and multimedia materials into English teaching could benefit students' learning effects (Lai, Tsai, & Yu, 2009; Tsai, 2011). Instructions through the use of multimedia could also raise students' learning motivation and interest (Agnew, Kellerman & Meyer, 1996).

The term "multimedia" refers to combination of multiple technical resources for presenting information in multiple formats (text, images, graphic, and video) through multiple sensory formality (Schnotz & Lowe, 2003). The multi-sensory capacity of multimedia enhances students' retention of the class (Burden, 2002). The learning becomes more memorable (Thomas, 2003). Students are easy to recall the contents in the class by the vivid images in their mind. This is not only because there is more information available, there is also a wider variety of information so that idea and concepts become more concrete and students find the concepts easier to understand (Levy, 2002).

According to the dual coding theory, visual information is organized so that different parts of an imagined object are available in the same time for further processing; whereas verbal information seems to be recalled, processed, and used sequentially and can only be mentally reorganized in remembered sequence (Clark & Paivio, 1991). However, visual images can be modified in a great variety of special context and sensory dimensions (for example, by rotation, size, and color). Therefore, it is reasonable to assume that when we learn information in both visual and verbal forms, each form is stored in a separate cognitive system.

Clark and Mayer (2003) stated that working memory is the center of cognition since all active thinking takes place there. Learning requires that new knowledge and skills in working memory become integrated with existing knowledge in long-term memory. After encoding new knowledge and skills into long-term memory, the learner must be able to retrieve those skills from the long-term memory back into working memory (retrieval). Without this retrieval learning fails to transfer. Applying multimedia to instruction must guide the learner's transformation of words and pictures in the lesson through the sensory and working memory so that they get incorporated into the existing knowledge in long-term memory. Interactive whiteboard (IWB) can connect well

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with multimedia materials. In 2006, MOE subsidized some schools building e-learning classrooms and started to use IWB in the classroom settings in Taiwan.

The IWB is a board which users can not only use it to project images with computers, but to operate the computers either by doing the actions on the board or the mouse of computers. IWB also packs some software so that the users can directly write on the board and use the tools to control the content (Beauchamp, 2004). IWB is attractive to students because it includes versatility, multimedia and fun (Hall & Higgins, 2005). Versatility allows students to access a wide range of resources through the technology (Levy, 2002). Multimedia increased students' motivation and attention span in the class since IWB makes learning more enjoyable and fun in the class (Wishart & Blease, 1999; Levy, 2002).

When teachers begin to use IWB as a teaching tool, there are some different stages that they need to go through before they can really manipulate well of IWB. Glover and Miller (2004) stated three levels of using IWB by teachers in their research: 1. Supported didactic: where the IWB is used to enhance traditional board-focused didactic teaching. 2. Interactive: where the teacher recognizes some of the additional benefits of the technology and endeavors to stimulate interactivity by questioning and involvement of pupils. 3. Enhanced interactive: where the teacher moves from the instructional to the involvement role and uses the technology to stimulate, integrate and develop interactive learning. When teachers start to use the IWB, they may use it as only a projector or a writable screen. After they get familiar with the functions and software, they begin to know the convenience of interaction. At the last stage, if teacher is not the only authority in using IWB, students can have more time and involvement on their learning through IWB.

For the low achievers of English learning, it is important to arouse and maintain their learning motivation through the process of teaching and learning. IWB can motivate students because the courses are more enjoyable and interesting (Beeland, 2002). The multimedia aspects of IWB also helps students engage in several authentic activities which is visual, audio and touchable (Hall & Higgins, 2005) and children learn best through the senses of seeing, hearing and touching (Walker-Tileston, 2004). IWB incorporates all these three elements at the same time.

In Taiwan, IWB in the classroom has increasingly widely used in recent years but the majority of research of IWB has focused on the domains of mathematics and natural science and little research has been studied on its effects in the English classroom, especially on low achievers. Thus, this study attempts to know whether IWB can help improve low achievers' performance in English learning.

Purpose of the Study and Research Questions

The purpose of this study was to know the effects of integrating IWB into English remedial instruction for elementary school low achievers and investigate the changes of students' learning motivations. Given the theoretical positions taken for the study and the status of the field as briefly reviewed above, the study aimed to provide an answer to the following questions:

1. Is IWB beneficial to low achievers of primary schools in English learning?
2. Among four language skills (e.g., listening, speaking, reading and writing), which skill can IWB help the learners improve the most?
3. Can the application of IWB improve low achievers' attitude in English learning?
4. Can the application of IWB enhance low achievers' confidence in English learning?

Method

This study was conducted to know how IWB benefits English learning of low achievers in elementary schools; therefore, an experimental research was designed. It consisted of an experimental group and a control group. The students who were taught with IWB remedial instruction were arranged into the experimental group and those who did not accept the instruction with IWB was placed into the control group. The independent variable was the IWB remedial instruction and the dependent variables were students' learning motivations and performances. A pretest and a posttest as well as a survey questionnaire were administered on both groups before and after the experiment.

Participants

The participants in this study were 20 low achievers of fourth grade from an elementary school in Chiayi County. They had studied English for one year since they were in grade three, two classes (80 minutes) per week and were selected out of 60 fourth graders by a pretest. Those who got the scores below the mean were considered as the participants. Ten of the 20 students who received IWB remedial instruction were assigned into the experimental group. The other 10 students who received traditional remedial instruction were grouped into the control group.

Instruments

The instruments used in this study were IWB, an English learning motivation questionnaire (ELMQ), and an English proficiency test. The questionnaire was adopted to measure the participants' learning attitude and confidence. The pretest and posttest were used for identifying their English performance.
Interactive Whiteboard (IWB)
According to different software and induced technology, IWB can be categorized into three kinds: electromagnetic, analog resistive and ultrasonic, laser and infrared. The types of IWB commonly used in Taiwan are SMART Board, Active Board and It-Board. In this study, the research used SMART Board as a teaching and learning tool.

English Learning Motivation Questionnaire (ELMQ)

The English learning motivation questionnaire (ELMQ) focused on participants' attitude and confidence of English learning. The ELMQ consisted of 10 items and used a 5-point Likert scale, ranging from strongly agree, agree, neutral, disagree and strongly disagree. The more scores they got from the ELMQ, the higher learning attitude and confidence they held. As to the test for internal consistency, the reliability coefficients were .87 for attitude and .83 for confidence.

English Proficiency Tests

The English proficiency test was designed according to students' textbook that they had learned in grade three. Those students were given a pretest identify their proficiency level before the instruction and a posttest after receiving the IWB remedial instruction. The tests contained four parts, listening, reading, writing and speaking. The scores were calculated into five categories: listening, reading, writing, speaking and total.

Results and Discussion

The purpose of this study was to examine the effect of IWB integrated into English remedial teaching of fourth graders. In this section, the results of the study are presented in terms of participants' test performances, motivations toward English learning. The results from ELMQ and English proficiency tests were analyzed by ANCOVA.

Results of the Posttest of English Proficiency: Total Score

The mean score of the posttest of experimental group was 69.5, and of the control group was 67.6. To inspect precisely the effect of English remedial instruction on participants' English performance, ANCOVA was utilized to control initial differences in participants' pretest. Before the analysis of ANCOVA, tests of homogeneity of with-in regression was conducted to know if it was workable to examine the data by ANCOVA. The interactions of the independent variable (group) and the covariate (English proficiency pretest) was not significant (F=.83, p >.05), suggesting that the assumption of with-in regression homogeneity was supported. Therefore, the effect of English remedial instruction on participants' English proficiency could be analyzed by ANCOVA.

In Table 1, the result of ANCOVA presented that after excluding the interference of covariate (English proficiency pretest), the effect of independent variable (English Remedial Instruction) on the dependent variable

(English proficiency posttest) was significant (F= 5.03, p < .05). The results indicated that scores of the proficiency posttest were significantly different between the two groups because of different experimental condition. The adjusted mean score of the experimental group (M= 70.73) was significantly higher than that of the control group (M=66.36). The results supported that after English remedial instruction, the scores of the experimental group were significantly higher than those of the control group. More specifically, the findings supported that IWB is beneficial to low achievers of primary schools in English learning.

Table 1. ANCOVA of English Proficiency Posttest

Source	SS	DF	MS	F
Proficiency pretest	1276.84	1	1276.84	69.11
Group	93.05	1	93.05	5.03*
Error	314.06	17	18.47	
Corrected Total	1683.95	19		

*p< .05

Results of the Posttest of English Proficiency: Four Skills

Listening

The listening scores of English proficiency posttest were presented in Table 2. The mean score of the experimental group (M=25.50) was nearly the same with the mean score of the control group (M=25.20), resulting in that there was no significant difference of participants' listening scores (F=2.39, p >.05) after English remedial instruction. In other words, the listening performance of the experimental group and that of the control group were not significantly different. Through the remedial instruction, the teacher of control group improved participants' listening and speaking abilities by playing games while the teacher of IWB groups used multimedia materials to help students learn. Therefore, there was no significant difference between the two groups in listening.

Speaking

The speaking scores of English proficiency posttest were presented in Table 2. ANCOVA analyses showed that there was a significant difference of participants' speaking scores (F=9.08, p <.05) after English remedial instruction, with the mean score of experimental group (M=6.70) higher than that of control group (M=5.60). To sum up, the experimental group had a better performance in speaking than the control group.

Reading

The reading results of English proficiency posttest were presented in Table 2. ANOVA analyses showed that there was a significant difference of participants' reading scores (F=14.72, p<.05) after English remedial instruction, with the mean score of the experimental group (M=22.50) higher than that of the control group (M=18.60). That is, the experimental group had a better performance in reading than the control group.

Writing

The writing performance was presented in Table 2. Although ANCOVA analyses presented that there was a significant difference of participants' writing scores (F=11.47, p <.05) after English remedial instruction, the mean score of experimental group (M=15.00) was lower than that of control group (M=18.20). Therefore, the control group had a better performance in writing than the experimental group. IWB allowed only one or two students to come up and write at the same time; therefore, it took too much time if the teachers asked all the participants to practice on the broad. And the electronic pens of IWB also affected participants writing. Martin

(2008) also finds similar problem and states that the tools for touching on the screen were inconvenience to operate and students had difficulties to write what they wanted.

Table 2. Descriptive Statistics of Four Skills of English Proficiency and ANCOVA Analyses

	Experimental Group Mean (SD)	Control Group Mean (SD)	ANCOVA F
Listening	25.50 (4.30)	25.20 (2.89)	2.39
Speaking	6.70 (.95)	5.60 (1.71)	9.08**
Reading	22.50 (2.54)	18.60 (5.25)	14.72**
Writing	15.00 (3.91)	18.20 (3.42)	11.47 **

** $p < .01$

Results of the Posttest of ELMQ

After receiving English remedial instruction, the mean score of the experimental group was 35.40 while that of the control group was 28.60. To accurately assess the effect of the English remedial instruction on participants' learning motivation, an ANCOVA was utilized to control initial differences in participants' ELMQ pretests scores. In addition, a test of homogeneity of with-in regression was conducted to examine if it was suitable to conduct the ANCOVA. The interactions of the independent variable (group) and the covariate (ELMQ pretest) was not significant ($F=.14$, $p > .05$). The result of the homogeneity test was correspondent with the assumption of with-in regression homogeneity. Therefore, ANCOVA could be used to evaluate the effect of English remedial instruction on participants' learning motivations.

ELMQ—Attitude

The results in Table 3 showed that there was a significant difference of participants' scores of English learning attitude ($F= 42.04$, $p<.05$) after English remedial instruction, with the mean score of experimental group (M=20.10) higher than the mean score of control group (M=15.50).That is, the experimental group had more positive attitude in learning English than the control group after remedial instruction.

ELMQ-- Confidence

The result in Table 3 showed that there was a significant difference of participants' scores of English learning confidence ($F= 9.19$, $p<.05$) after English remedial instruction, with the mean score of experimental group (M=15.30) higher than that of control group (M=13.60).That is, the experimental group had more confidence in learning English than the control group after remedial instruction.

Table 3. Descriptive Statistics of ELMQ and ANCOVA Analyses

	Experimental Group Mean (SD)	Control Group Mean (SD)	ANCOVA F
Attitude	20.10 (2.42)	15.50 (2.49)	42.04 ***
Confidence	15.30 (4.57)	13.60 (2.87)	9.19 *

*$p <.05$, *** $p <.001$

Conclusion

This study aimed to investigate the effect of IWB as a teaching and learning tool on elementary school low achievers in English remedial instruction and examine their motivational change after the remedial instruction. The research was conducted by an experimental instruction of 20 fourth graders.

First of all, the findings indicated that even both groups made progress after eight-week instruction; the IWB group had more significant effect on students' English proficiency. The use of IWB for teaching and learning in EFL remedial class helped improve students' speaking and reading abilities significantly, but concerning with students' listening ability, students' improvement in these two groups did not show much difference. As to writing ability, on the contrary, students in the group without IWB have a better performance than those in the

IWB group, since without interacting with the IWB, the students in the control group had more time to practice writing.

Secondly, participants' learning and confidence toward English learning were significantly changed in IWB group than in the control group. The results of this study indicated that IWB integrated into English remedial instruction changed students' personal interest in English learning.

After eight weeks of English remedial instruction, participants' attitudes of English learning changed positively, which is consistent with the result studied by Weiner (2001) showing the improvement of students' motivation in an IWB class. The remedial instruction with IWB of the study also helped improved the low-achieving students' English reading and speaking since using IWB could motivate students because the instruction became more interesting so that students' attention in the class was improved (Beeland, 2002). In brief, teachers can make good use of IWB which is considered fun, interactive to attract students' attention and thus enhance their retention.

Limitations of the Study

In this study, several limitations existed and affected the result. First, the school administration policy affected the English remedial instruction. The schedule of remedial instruction was adjusted two times because of the field trip and county English competition. The researcher needed to spend some time in reviewing the lessons. Especially during the period of county English competition, because researcher responded for the training in school, so the instruction was suspended about two weeks.

The second one is the technical problem. The materials that used for the IWB group needed to be interactive so that can reflect the feature of IWB. But because teacher lacked the skill of making interactive material, so the material that used for IWB group came from the textbook publisher. Therefore, when researcher designed lesson plan, the content of interactive software must be concerned. There are also some functions of IWB software; however due to the software is not user friendly, the teacher can't manipulate it very well. Thus teacher and students only use the functions of pen and eraser that can write on the IWB most of the time

Third, the participants in this study were limited to 20 fourth graders from two classes in elementary school in Chaiyi County. The results may not be inferred to all the elementary school students.

Pedagogical Implications

This study presented that participants benefited significantly through ICT integrated instruction. According to the classroom practice, the study has the following implications:

First, the participants in this study were low achievers; therefore, the learning material was based on what they had learned in third grade. In order to keep the learning easy and simple for those students, the content was focused on alphabet, phonics, vocabulary and sentence patterns. Simple learning material can make students not to feel frustrated in learning English. When students can read the vocabulary and sentence patterns by themselves gradually, they can build up their confidence of learning English and then improve their English performance.

Second, there was a problem that most of the low achievers would forget what they have learned easily. So in the beginning of every class, teacher would review the vocabulary and sentence patterns that they had learned each time. The participants could have the chance to review the content and through the repetitions of every time, they would not forget the materials easily after learned new things.

Third, the participants were interested in using IWB and teaching through IWB could enhance participants' learning motivation. However, by the teacher's limited ability of designing interactive learning materials, the interactive material that used in this study was made by textbook publisher. The whole units were made by the same pattern. Participants were easily to get bored after four or five units. However, if the interactive material could have different kinds of activities or games, there would be more teaching benefit for students.

Suggestions for Further Research

There are some suggestions for further researchers. First, a large scale IWB integrated into English remedial instruction study may extend the findings of current study. In this study the subjects were only 20 low achievers in an elementary school of Chiayi County. A larger sample from different school is needed.

Second, the remedial instructions in this study were taught during the morning studying time and afternoon break time individually. Because of school's activities, the remedial needed to be canceled sometimes; therefore researcher needed to postpone the schedule and made up the class first. Further researcher maybe can consider starting the remedial instruction before the beginning of the semester and hold the remedial instruction for a whole semester, in this way researcher will have more time to teach the instruction.

Third, the participants in this study were fourth graders, and the time of remedial instruction fell on the second semester. For those low achievers, most of them felt frustrated in the regular English class from third grade. Thus if the remedial instruction can be implement from the second semester of grade three that would be much helpful to those students.

Fourth, to see the IWB integrated into remedial instruction really affect participants' performance and motivation, or just because IWB was a new learning tool for them, a follow-up study is suggested to trace whether those participants can continue to make progress in the English class and maintain the motivations of English learning.

Fifth, teacher and students need to practice more often of how to use the IWB. Especially teachers had better to have the skill of designing their own interactive software for their class. The software of IWB should be more user friendly as well so that both teachers and students can make the most benefit of IWB.

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