

Integration of computers into an EFL reading classroom

KANG-MI LIM AND HUI ZHONG SHEN

*Faculty of Education and Social Work,
The University of Sydney, NSW 2006, Australia
(e-mail: kangml@hotmail.com, h.shen@edfac.usyd.edu.au)*

Abstract

This study examined the impact of Computer Assisted Language Learning (CALL) on Korean TAFE (Technical and Further Education) college students in an English as a Foreign Language (EFL) reading classroom in terms of their perceptions of learning environment and their reading performance. The study compared CALL and traditional reading classes over one semester by measuring students' reading performance. A group of 74 first year English major students were divided evenly into two classes. Both groups were taught by the same teacher and covered the same topics in their weekly two-hour reading lessons. A reading comprehension test was given at the beginning and the end of the semester to measure the students' performance. A written survey was also administered at the end of the semester. Classroom observations and group interviews with students supplemented the data obtained from the surveys. Analysis of Covariance (ANCOVA) was used for the performance test to explore the differences between the two classes while statistically controlling for the pre-test (covariate). The questionnaires were analyzed by a principle component factor analysis, a repeated-measure ANOVA and a discriminant analysis whereas the interviews with students were analyzed by a content analysis. Students' performances in the pre-test and the post-test were not significantly different between the two classes. However, the students in the CALL-based English class were more positive in their perceptions of their learning environment than were those in the traditional English class. This study shows that computer technology had a positive impact on students' perceptions of their learning environment, especially in relation to learning materials and tasks, and with regard to interaction and collaboration with the tutor and other students.

Keywords: EFL reading, Call-based, collaboration, interaction, hypermedia

1 Introduction

Although research in the field of computer-assisted language learning has certainly developed in the last 20 years (Chapelle, 2000; Chapelle & Hegelheimer, 2000; Dunkel, 1991; Kern, 1995; Levy, 1997; Sullivan & Pratt, 1996; Warschauer, 2000), there appear to have been few studies of the issues, problems, and potential solutions relating to the

impact of computers on English language teaching and learning in the Korean context, particularly in a comparative study in a reading classroom.

The limited comparative studies that have been conducted have been criticised from another point of view: lack of clarity in the definition, description and control of relevant variables by the researchers (Levy, 2001; Pederson, 1987). However, educators are increasingly concerned to integrate human and computer capabilities as efficiently as possible. There is an increasing demand in language teaching for evidence on which to base decisions about the use of these ever more prevalent tools, a situation that calls for such comparative studies (Allum, 2002; Echavez-Solano, 2003). Strambi (2001) examined the effect of a web-enhanced classroom on beginner students of Italian language over one year at the University of Sydney, Australia. In this study, the students' perception was that web-enhanced learning offered more interaction with a variety of interesting, enjoyable and useful materials and tasks. The researcher concluded that this interaction sustained and enhanced the students' motivation. It would be interesting to observe how more CALL rather than web-based materials might affect Korean EFL students in a similar learning context.

In a different context, Bradley and Lomicka (2000) undertook research focusing on learner interaction in two third-semester technology-enhanced language classrooms, one French and one Spanish. Through extensive observation and interviews, students reported that interaction within the class seemed to be lacking. Although this study involved a small number of participants and so cannot necessarily be generalised, it shows that if the computer-enhanced environment is not inherently communicative, instructors may need to consider more carefully task design by going beyond viewing the goal of tasks as simply 'obtaining information' without real integration.

The present study examines the similarities and differences between the traditional English reading class and the CALL-based English reading class in the Korean context in terms of students' perceptions of the learning environment, which refers to classroom culture including the setting, the role of the teacher and the learner, patterns of interaction, and ways in which teaching and learning are organized in a Korean reading classroom. The implications of these similarities and differences will be investigated in order to assess the impact of computers in college-level EFL classes in Korea. This study examined these questions:

- 1 To what extent do students differ in their perceptions and learning in the traditional and CALL-based reading classrooms?
- 2 Does CALL-based classroom instruction result in better reading comprehension than traditional classroom instruction?

The two questions will be examined with empirical evidence gathered from four different research instruments.

2 Method

Primarily a quantitative research, the study incorporated mixed research methods to examine the impact of CALL in a college of technology in Korea. Mixed-design methods have frequently been implemented by CALL researchers, who have employed a

variety of instruments and procedures “to strengthen and cross-check the data before conclusions are made” (Levy, 2000; Strambi, 2001). This study compared the CALL and traditional reading class over one semester by investigating students’ perception of their learning environment, as shown in Table 1.

The same instruments were used for the two classes to allow a comparison of the CALL and the traditional reading classes. A written survey was administered at the end of the semester, which consisted of questionnaires in two parts. Group interviews with four students from the two classes, and one interview with the teacher were conducted to supplement the data obtained from the surveys. An important aspect of this mixed methodology is that it provides opportunities for triangulation. The employment of different instruments allows the results to be cross-validated. Multiple data sources and analysis procedures, such as surveys, interviews with the teacher and with students, together with observation, offer complementary views of the same object of inquiry, and thus enhance validity and increase the depth and breadth of the understanding that the study obtains (Burns, 2000; Wadsworth, 1997; Motteram, 1999).

2.1 Students

All of the students in the traditional English classroom and CALL-based English classroom were in their 20s, and their mean age was 21.5 years in the traditional class and 21.0 years in the CALL-based class. School enrolment records indicated that all the subjects participating in this research had completed their high school study.

In addition, female students outnumbered male students both in the traditional English class and in the CALL-based English class. There were no significant differences between the traditional English class and the CALL-based English class in terms of age ($t = 0.835$, $p = 0.408$), gender [Class (2) sex (2) contingency table $\chi^2 = 0.939$] and education background. This indicates that the two groups are very similar. It is therefore fair to say that comparisons could be made between the traditional English class and the CALL-based English class.

Table 1 *Research design*

		Traditional English class	CALL-based English class
Teacher		Same teacher	
Students		37 first English majors	37 first English majors
Materials	Session 1	Textbook: Active skills for reading I	
Materials	Session 2	Textbook: Active skills for reading I	CD-ROM, website
Teaching methods	Session 1	Teacher-centred teaching	
	Session 2	Student-centred teaching	

3 Results

Data collected were systematically entered into a computer for quantitative and qualitative analyses. Quantitative data were arranged into spreadsheets, and later analysed using the Statistical Package for the Social Science (SPSS), version 11.5. Recorded interviews were transcribed. The focus-group interview transcripts were subjected to content analysis in order to identify emerging themes and trends.

3.1 Performance test

Results obtained by participants in the pre-test and post-test were compared for the traditional English class and the CALL-based English class in order to determine the effect of CALL-based English teaching on learning outcomes. At the beginning and end of the semester, students sat for the Korean University Entrance mock test. This included 65 participants: 35 students from the traditional class and 30 students from the CALL-based English class sat the test. The results of the pre-test and post-test from the two classes were discussed in a result analysis of covariance (ANCOVA). The mean result of the pre-test for the traditional reading class was 53.8/100 whereas that for CALL-based reading class was 49.4/100. In other words, the traditional reading class started with a slightly better reading performance compared with that of the CALL-based reading class. For the post-test, the mean result of traditional reading class was 59.8/100 whereas the mean of the CALL-based reading class was 53.3/100 as shown in Table 2.

ANCOVA was used for the performance test to explore the differences between the two classes while statistically controlling for the pre-test (covariate). One-way ANCOVA was selected from the SPSS menu, including the post-test results as the dependent variable; the two methods of instruction were selected as the independent variable. Pre-test scores were also entered as a covariate. The SPSS program uses regression procedures to remove the variation in the dependent variable that is due to the covariate, and then performs the normal analysis of variance techniques on the corrected or adjusted scores. By removing the influence of these additional variables, ANCOVA detects differences between two adjusted means (Pallant, 2001). The average numbers of standard deviations of post-test scores were adjusted for the covariate pre-test as presented in Table 3.

The main ANCOVA results are presented in Table 4, 'Test of Between-Subjects Effects'. These indicate whether the two classes were significantly different in terms of students' scores on the post-test.

Table 2 *Proportion of pre- and post-tests*

	Class	Mean	Std. Deviation	N
Proportion (pre-test)	Traditional English class	0.538	0.208	30
	CALL-based class	0.494	0.175	30
Proportion (post-test)	Traditional English class	0.598	0.185	30
	CALL-based class	0.534	0.136	30

Table 3 *Adjusted proportions correct for the post-test*

Adjusted proportions correct	
Traditional class	0.586
CALL-based class	0.546

Table 4 *Tests of between-subjects effects (Dependent variable: Post-test scores)*

Source	Type III Sum of Squares	Df	Mean Square	F	p
Pre-test	0.630	1	0.630	39.850	0.000
CLASS	0.024	1	0.024	1.523	0.222
Error	0.901	57	0.016		
Corrected Total	1.555	59			

The probability of the difference between the two classes (methods of instruction) is 0.222, which is greater than 0.05 ($F(1,57) = 1.523$, $p = 0.222$). Therefore, there was no significant difference in the post-test score for students in the traditional English class and the CALL-based English class, after controlling for the pre-test score administered prior to the intervention. In other words, the CALL-based teaching did not appear to differ from traditional classroom teaching in its impact on the students' reading performance.

The absence of a significant difference in the post-test performance of the two classes is perhaps not surprising. The period of instruction was relatively short, being only one semester, and the improvements of both classes were small. That is, an ANCOVA (see Table 5 below) comparing the pre-test and post-test performances of the two classes, detected a significant difference ($F(1,58) = 6.196$, $p = 0.014$), but there was no interaction with class difference ($F(1,58) = 1.683$, $p = 0.200$), nor was there an overall difference between the two methods of instruction ($F(1,58) = 0.267$, $p = 0.608$). In short, method of instruction did not produce a substantial improvement in performance over the one semester using the Korean University Entrance mock test.

The fact that there is only a small improvement in reading performance in a modified instructional context makes it difficult for subtle instruction-type differences to be detected. That is to say, evidence of differences in learner performance improvement in fairly basic language skills as a consequence of a different type of instruction might require longer than one semester for it to be observable. In general, the introduction of a new technology (or teaching innovation) improves things other than core academic outcomes or aspects measured by standard attainment tests: collaborative skill in the classroom, for example. In particular, since student performance did not decrease after one semester, the positive effect of the computer was revealing, given the fact the learners were expected to adapt to and cope with a new learning environment that requires changes in learning styles and learner strategies (Oxford, 1990, 1993; O'Malley & Chamot, 1990).

Also, as the results of the surveys reported below show some differences in perception and attitude between the traditional English class and the CALL-based English class, it is probably premature to say that the consequences of computer-dependent instruction do not differ from those of traditional classroom instruction. However, more work needs to be done to compare performance differences under the two varied instructional conditions, using more precise measurements of more restricted learning tasks (e.g. vocabulary knowledge; extensive reading) over a longer period of time.

3.2 The questionnaire

There were four factors extracted from the survey by a principle component factor analysis and a repeated-measure ANOVA was used to examine statically factor score differences between the two methods of instruction (classes). Consequently, the two methods of instruction for the two classes were compared in terms of the factor scores, and then a discriminant analysis detected three items, which best differentiated the two classes.

3.2.1 A principal component factor analysis

Quantitative data extracted from the survey were submitted to an exploratory principal component factor analysis with varimax rotation, in order to identify relationships among items, and therefore, the subscales or factors which could be taken as summary measures of the items. Negative items were reverse scored (e.g. item 19), so that a positive factor score reflected a positive perception. The four extracted factors, which each included items that loaded more than 0.550, measured learners' perceptions of:

Course effectiveness (items 16, 3, 6, 15): This subscale reported learners' evaluation of their understanding of the academic subject, as well as availability of informative feedback and the effectiveness of materials.

- 16 *I have learned a lot in this course. (0.809)*
- 3 *You get feedback in tutorials which help you learn. (0.724)*
- 6 *The material is useful. (0.720)*
- 15 *I have gained a good understanding of the language system. (0.694)*

Tutor (items 13, 12, 14, 7): This subscale collected learners' evaluations of their tutor's contributions and comments, as well as on the tutor's attitudes to their teaching.

- 13 *The tutor knows the subject matter well. (0.885)*
- 12 *The tutor stresses important points. (0.774)*
- 14 *The tutor communicates his/her enthusiasm for the subject. (0.747)*
- 7 *The tutor is professional in attitude. (0.672)*

Course interest (items 1, 10, 19, 18): This subscale included presenting materials in an interesting way, as well as learners' disposition towards recommending the course to fellow students.

- 10 *The tutor presents material in an interesting way. (0.898)*
- 1 *The tutorials are well organized. (0.651)*

Table 5 Pre- and post-test comparisons (computed using $\alpha = 0.05$)

Source	Sum of Squares	Df	Mean Square	F	P
Between: Class	0.087	1	0.087	1.683	0.200
Error	2.996	58	0.052		
Within: Test	0.075	60 1	0.075	6.408	0.014
Test x Class	0.003	1	0.003	0.267	0.608
Error	0.674	58	0.012		

19 *I would recommend this language course to fellow students. (0.607)*

18 *I found the language course interesting. (0.568)*

Course difficulty (item 17): This item was considered separately since it did not appear to be related to any other included in the survey. Learners were asked to state whether they had perceived the course to be more difficult than other subjects for their course.

17 *The subjects were more difficult than others I have taken for the course. (0.965)*

Of the 19 items included in the survey, six items were discarded because these items spread out to three or even four factors, or their factor loading was too low (e.g. 0.025 or 0.034), which was less than 0.550.

3.2.2 A repeated- measure ANOVA

The factor scores were calculated by the regression method, for which the factor loading was adjusted to take account of the initial correlation between variables. In doing so, differences in units of measurement and variable variances were stabilized (Field, 2003).

An ANOVA compared the responses of the two classes on the four factors, in a (Between Classes) X 4 (Within Factors) design. Because of the exploratory nature of these comparisons the Alpha level was set at 0.10 for significance. This analysis showed that the differences between the more positive responses of the CALL-based English

Table 6 Excluded items

Items	
2	You can discuss difficulties with the tutor.
5	The textbook is clear and interesting.
9	The tutor is willing to help students.
8	The tutor welcomes student feedback on the classes.
11	The tutor structures the material well.
4	The volume of work to be covered is appropriate.

class and the traditional English class reached significance [$F(1,58) = 3.689, P = 0.06$].

Although neither the test of the interaction between instruction type and the factor differences nor the test of the differences between the factors, approached significance [$F(3,174) = 0.698, p = 0.56$ and $F(3,174) = 0.08, p = 0.99$], the two classes appeared to differ more on some factors than on others.

Given that these were exploratory comparisons and the difference between the two classes appeared to be greater on some factors than on others, each factor was looked at separately, as can be seen in Figure 1.

While students in the CALL-based English class expressed more positive responses on their reading class than students in the traditional class in terms of the four factors: classroom effectiveness; tutor; classroom interest; and course difficulty, the biggest difference was on the factor of Interest. The factor of Interest consisted of four items as shown in Table 8.

The information collated in the summary table shows the students in the CALL-based English class indicated much higher on these statements than the students in the traditional English class in terms of the four items. The “interest” is the most frequently discussed in literature pertaining to affective variables and the impact of computer assisted language learning (Adair-Hauck, Willingham-McLain, & Youngs, 1999; Ayres, 2002; Echavez-Solano, 2003).

3.2.3 Discriminant analysis

Discriminant analysis was applied for the survey in order to determine which of the independent variables account for the most of the differences between the two classes. The dependent variable was the traditional class and the CALL-based class and the independent variables were the 19 items of the survey.

The group centroid was -0.813 for the traditional English class, while that of the CALL-based English class was 0.813 , as calculated in Table 9. A classification analysis was also done in which the two groups of subjects were compared to show the correct percentage.

While 76.7% (23) of traditional English classroom students were correctly classified, 83% of CALL-based English students were correctly classified. The total percentage of

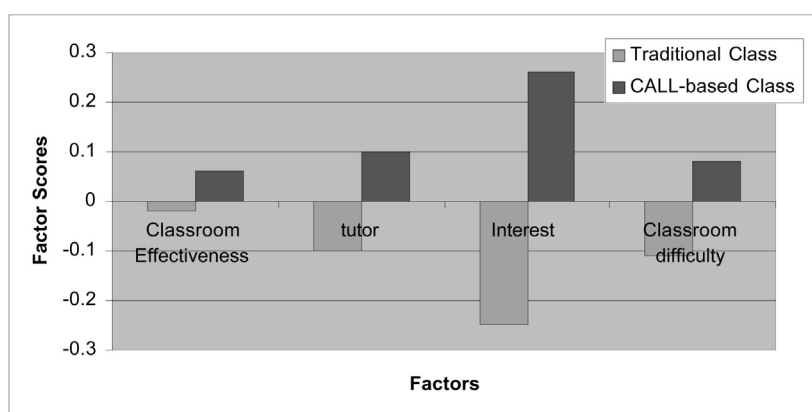


Fig. 1. Classroom evaluation.

Table 7 Tests of within factors and between classes

Source	Type III Sum of Squares	Df	Mean Square	F	P
Between:					
Class	3.407	1	3.407	3.689	0.06
error	53.571	58	0.924		
Within:					
Factors	0.023	3	0.008	0.008	0.999
Factors X Class	1.939	3	0.646	0.698	0.555
error	162.190	174	0.926		

Table 8 Factor "interest" subscales – traditional class vs. CALL-based class

Sub Scale	Traditional Class		CALL-based Class	
	M	SD	M	SD
1 The tutorials are well organized.	3.05	0.98	3.48	0.87
10 The tutor presents material in an interesting way.	2.78	1.15	3.15	0.93
18 I found the language course interesting.	3.00	1.06	3.54	0.90
19 I would recommend this language course to fellow students.	3.00	1.01	3.45	1.00

students correctly classified by the function was 80%, as shown in Table 10.

Three significant classification items were found (See Table 11). The first item was dominated by the teacher's attitudes (item 8), the second item was classroom interest (item 18) and the third item was to recommend the language course to other students.

In looking at group means (See Table 12), the CALL-based class scored higher on those three items than the traditional class in terms of tutor, classroom interest and the recommendation to their fellow students. That is, the computer-assisted instruction has resulted in significantly more positive perceptions of feedback, greater interest and a stronger recommendation to other students. Namely, effective teaching styles and classroom interest characterized the CALL-based English class.

3.3 Qualitative data and analysis

Quantitative data have been supported by an analysis of qualitative data. The interview with the teacher of the CALL-based class, and focus group interviews with four students from each class produce another set of data for triangulation.

3.3.1 The teacher's attitude

Despite positive responses by students using computers in the classroom, the teacher

Table 9 *Functions at group centroids*
(unsustainable canonical discriminant functions evaluated at group means)

Class	Function
	1
Traditional class	-0.813
CALL-based class	0.813

Table 10 *Classification results (80% of original grouped cases correctly classified)*

Class		Predicted Group Membership		Total	
		1.00	2.00		
Original	Count	Traditional class	23	7	30
		CALL-based class	5	25	30
	%	Traditional class	76.7	23.3	100.0
		CALL-based class	16.7	83.3	100.0

had a negative attitude towards teaching English in a computer based environment. The teacher was used to teacher-centered language teaching and was not comfortable in the CALL class. The teacher respondent considered that she could control students in the traditional classroom, and she was also unfamiliar with the technology in the CALL classroom. She expressed her frustration with the computer:

“It’s always technology related issues. And these technological problems usually bring trouble to students and myself.”

To adapt to CALL-based language teaching the teacher was aware that she would need to integrate computer technologies into nearly all of her classroom activities. She found it difficult to control and manage learning in a CALL-based environment:

“I would prefer the traditional English class because it is easy for me to manage the traditional English class (control the students). I often feel as if student’s not learning anything. I feel like teaching anything. It seems that the students in CALL-based English class played around the Internet than the students in the traditional English class.”

While the negative feeling of the teacher towards working in a computer based environment is obvious, it is implied that the role of the teacher and the learner in a CALL-based classroom are changing. Perhaps it is indeed that new technologies may be forcing a different understanding of the role of the teacher in the process of language program design and classroom instruction. In CALL classes the role of the teacher as a knowledge transmitter was minimized compared with the traditional classroom (Johnson & Brine,

Table 11 *Structure matrix. (Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions. Variables ordered by absolute size of correlation within function.)*

Items	Function
B8 The tutor welcomes student feedback on the classes	0.488
B18 I found the language course interesting	0.435
B19 I would recommend this language course to fellow students.	0.312

Table 12 *Group statistics*

	Class	N	Mean	Std. Deviation
B8	Traditional Class	34	3.44	1.09
	CALL-based Class	33	4.24	0.90
B18	Traditional Class	33	3.00	1.06
	CALL-based Class	33	3.55	0.90
B19	Traditional Class	34	3.00	1.02
	CALL-based Class	33	3.45	1.00

2000; Stepp-Greany, 2002; Sullivan & Pratt, 1996). Therefore, the teacher may have to work out new ways to maintain control and direction in a CALL-based language class.

3.3.2 *Learners' perceptions of the learning environment*

Students in the CALL-based class indicated that their learning environment was more positive than that in the traditional class. Students' attitudes appeared to have been influenced by a number of factors, principally related to their perceptions of a positive classroom atmosphere. Particularly appreciated were the opportunities for interaction and collaboration with other students offered in the classroom, as well as intrinsic features of web-enhanced materials and tasks, perceived as facilitative of learning.

The overall results indicated that students in the CALL-based class enjoyed their learning more than students in the traditional class, in particular, those students who were used to studying English reading with textbooks at secondary schools. Those groups of students responded positively on their learning English with computers in their first year at college, as shown from the interviews with members of the CALL-based class:

"We interact and know each other well, and the use of computer makes the class more enjoyable."

"We didn't use the computer in the English classroom at the secondary school so it was the first experience to learn English through the computer, which was fun for me to work in the class."

“I enjoy the CALL class because studying English reading with computer makes it more fun rather than reading with textbooks.”

The students in the CALL-based class indicated that a friendly and supportive classroom atmosphere was among the most positive aspects of their experience, as illustrated by the following comments:

“Our group is nice and easy to interact with so I can ask whatever I don’t know. Even I get technical support from my classmates as well.”

“I surf the Internet for the web sites and get information’ and the others find the vocabulary with the computer so our group intend to be creating collaboratively. However, [in the] first session usually, during the lecturing, I don’t have a responsibility so if I don’t feel like studying. I can play around.”

It was interesting to note that the students in the traditional class reported that they also prefer group work (second session) rather than lecturing (first session). However, these students indicated that there was no significant difference from the secondary school as shown in the response:

“We have got more group [work] in class but it was not big different from the secondary school. Still, we translate the sentence and find the vocabulary.”

4 Discussion

A close analysis of students’ perceptions in the two classes (the traditional English class and the CALL-based English class) showed a significant result. The students in the CALL-based English class were consistently more positive in their perceptions than were those in the traditional English class. Student performances in the pre-test and the post-test were somewhat disappointing, as no significant difference was detected between the improvements obtained in either class; the performance results did not show a learning advantage for the CALL-based students to reflect their more positive perceptions. The discussion will engage the first research question:

Research question 1: To what extent do students differ in their perceptions and learning in the traditional and CALL-based reading classrooms?

The significant difference between the two classes in the survey was classroom interest. The students in the CALL-based English class showed significantly higher interest in their learning in the class than the students in the traditional English class. Students in the CALL-based English class expressed the view that the materials were presented in an interesting way and that the class was well organised. These aspects were considered to be highly interesting and worth recommending to their fellow students.

This is consistent with the result of the discriminant analysis of the survey, which

extracts the significant functions that differentiate the traditional English class from the CALL-based English class. Of the three functions extracted from the discriminant analysis, two describe class interest: the second item, classroom interest (B18 I found the language course interesting.) and the third item, to recommend the language course to other students (B19 I would recommend this language course to fellow students).

Furthermore, in the focus group interview, the CALL-based English class also reported that online activities were especially enjoyable because of the medium, which provided variety and interactivity, and facilitated memorisation and retention. Indeed, it was observed that the CALL-based materials better connected the visual and auditory input to facilitate memorisation and observation than the textbook:

“Visual association (e.g. pictures, etc) often helps the memory and makes it more enjoyable.”

“The use of computers made the class more enjoyable.”

These findings are similar to those from other studies relating to CALL or technology-enhanced language learning. In general, classroom interest is one of the main benefits of the CALL-based class. The use of computers in language teaching appears to increase interaction with a variety of interesting, enjoyable and useful materials and tasks, which sustains and enhances the students' interest (Adair-Hauck, Willingham-McLain, & Youngs, 1999; Ayres, 2002; Echavez-Solano, 2003; Holmes, 1998; Meunier, 1999; Strambi, 2001; Warschauer, 1996).

However, it is important to note the limited effect of the novelty of working with the new medium, which has also been shown in previous studies (Strambi, 2001; Grisham, 2003; McNeil, 2000). As Warschauer (1996) explains, participants in a CALL-based class often observe that they experience enthusiasm during the initial time period but later lose interest in the class. Indeed, in the present study, students expressed interest and explained this in terms of not having experienced CALL-based classes in secondary schools, as shown in the following:

“We didn't use a computer in the English classroom in secondary schools so it was the first experience of learning English with a computer, which was fun for me to work in the class.”

Therefore, it would be interesting to observe if Korean students' interest levels would drop as time goes on. The impact of computers on learning English as a foreign language in the Korean college context, particularly in terms of maintaining a sustained level of interest, needs to be observed over a longer period of time.

In contrast, the finding of the present study is that students' responses in the CALL-based English class were not significantly different from those in the traditional English class in terms of classroom effectiveness, although students in the CALL-based English class showed significantly more interest in learning English compared with those in the traditional English class. The four items relating to classroom effectiveness were: learners' evaluations of their own understanding of the academic subject, as well as availability of informative feedback, the effectiveness of materials and effectiveness of the course.

Korean students' traditional concept of effective language learning is that perfection is sought through a painstaking understanding of each language item rather than by interacting with other students and teachers or by gaining knowledge of the culture (Hird, 1995; Lim, 2000). This traditional concept of effective learning may impact on the effectiveness of their learning environment. However, it takes time to adjust their learning styles and the expectation of the EFL classroom to fit in with a changed methodological and procedural paradigm.

Students in the CALL-based English class showed a more positive response than those in the traditional English class in terms of the tutor's contribution and comments, as well as the tutor's attitude to teaching. In the CALL-based English class, more students indicated that the tutor knew the subject very well, showed a professional attitude, stressed important points and communicated her enthusiasm for the subject, than was the case in the traditional English class. Students in this study were using computers in their classroom for the first time to learn English. Therefore, they may have felt that the teacher was very professional and knew the subject well, and that the teacher also needed to stress the important points.

The teacher in the study was teaching a CALL-based English class for the first time. Therefore, she needed to communicate with the students to get their feedback. This may have affected the result of the discriminant analysis on the survey. The first item to discriminate between the two classes was that "The tutor welcomes student feedback on the classes". Students in the CALL-based English class came up with a higher score than did students in the traditional English class on this item. In other words, more students in the CALL-based English class responded that their teacher welcomed student feedback on the class than those in the traditional English class. This may have meant the tutor was in need of more student feedback than if she had been more experienced with this style of teaching.

Research question 2: Does CALL-based classroom instruction result in better reading comprehension than traditional classroom instruction?

The second research question explores differences in the students' gains in reading comprehension in the CALL-based English class versus the traditional English class. Results from the Korean University Entrance mock test were considered in examining this question. There were no significant differences between the CALL-based English class and the traditional English class in terms of reading performance, although students in the CALL-based English class showed significantly more positive perceptions of their classrooms. In contrast, a number of studies have found that students in the technology-enhanced class in general did better than those in the traditional class in terms of their achievement (Kern, 1995; Ladyshevsky, 2004; Strambi, 2001; Sullivan & Pratt, 1996).

However, there have been studies which did not show significant differences between the CALL-based English class and the traditional English class in terms of their performance (Echavez-Solano, 2003; Lewis & Atzert, 2000). For example, Echavez-Solano (2003) compared the outcomes of technology-enhanced and traditional second semester Spanish classes and found no significant differences between the two. This study was limited by the short period of time and the validity of the pre- and post-

treatment oral proficiency tests because only a limited number of subjects completed them.

Indeed, one limitation of the present study is the short time span of the research. The impact of pedagogical interventions may not be visible in a single semester. In particular, improved educational performance resulting from different types of instruction would be visible only after a relatively prolonged period of time (Naiman et al., 1996; Ortega, 1997; Salaberry, 1996). A longitudinal approach would allow a deeper understanding of the learning environment investigated (Chapelle, 1998).

Furthermore, the teacher's negative attitude to CALL-based English teaching might have impacted on the students' performance (Debski & Gruba, 1999; Johnson & Brine, 2000; Kern, 1995; Lawrence & Lam, 2002; Stepp-Greany, 2002; Sullivan & Pratt, 1996; Zhong & Shen, 2002). The teacher's role is a particularly important factor affecting students' class performance, as noted by Nunan (1989). Reimann (2004) adds that the medium itself is irrelevant. Effective learning is determined by what teachers do with the technology in the classroom.

The fact that the present study was undertaken during the teacher's first experience with the CALL-based English class, and that she felt uncomfortable with it, may have hindered any improvements in students' performance. Clark (1994:22) argues that "necessary teaching methods could be designed into a variety of media presentations". This is achieved by changing his or her teaching from a traditional format to one which includes the technology, providing an example for the students and supporting them as they integrate the electronic resources into their class.

The results obtained in the Korean University Entrance mock test are not totally representative of participants' acquired knowledge and skills, in that they only measure their reading comprehension. Further research is needed to examine differences in student achievement by using additional measures (e.g. vocabulary knowledge tests, extensive reading tests etc) and by measuring these more frequently, as research shows that different evaluation strategies report different results (Doty, Popplewell, & Byers, 2001; Matthew, 1997).

The students in the CALL-based English class had experienced new teaching methods, which also required new learning skills. As shown in the classroom observation, students in the CALL-based English class spent comparatively less time than students in the traditional English class on grammar drills, in order that they could engage in the collaborative project and in other activities involving a more authentic use of the target language. Therefore, it seems reasonable to argue that they developed knowledge and skills that were not measured in the test. As Williams and Burden (1997) have noted:

Classes oriented towards innovation and building relationships help to create learner satisfaction and interest in the subject matter. They enhance social and personal growth, but do less well in facilitating traditional achievement scores (p 196).

From this perspective, even though there are no statistically significant differences between the two classes, the results reflect even greater meaning. In spite of all the limitations imposed by the curriculum and by the technology itself, the integration of CALL-based learning seems indeed to have contributed to students' learning in this course in the Korean college context.

Analysis of the data from the survey, interviews and other instruments shows that it is perhaps worth a second look at the argument that Korean learners and teachers, at least in this context, are more accustomed to rote learning that centers round the teacher who is the source of learning and knowledge (Lim, 2003), or an argument that learning is more effective in a setting where the teacher adopts a direct approach, as believed by many Korean teachers and students (Jeong, 2003). The statistical data provides evidence implying that learning is equally effective, if not more, as measured in the pre- and post-tests. Learners in a CALL-based classroom were also found to be more interested, engaged, playing a more active role in a range of interactive tasks. It is true that the tutor's role is nevertheless highly valued in this changed environment, as students express high expectation of teachers in terms of knowledge, skills and attitude. Perhaps it is fair to argue that as students and teachers start to change their perceptions of their role in the process of teaching and learning, they will become more consciously engaged in and capitalize on a task-based and learner-centered approach to teaching and learning.

5 Conclusion

Learning in the CALL-based English class provides numerous benefits enjoyed by participants in the use of technology in the language classroom. The integration of technology into the English reading classroom enhanced learning by providing more opportunities for exposure to and interaction with a variety of engaging learning materials and tasks. While there was an insignificant difference between the traditional English class and the CALL-based English class in terms of learning effectiveness, this might be caused by the Korean traditional teaching and learning style and the perception of the role of the teacher and the student in the learning process. However, it is obvious that the new learning environment with the integration of computers is facilitating such a change. Measuring learners' perceptions of learning under the computer medium and learner effectiveness is a complex process, and further studies are needed to investigate the long-term effects of computing technology on learning, focusing particularly on students' willingness and ability to learn.

Acknowledgement

The writers of this article wish to thank the anonymous reviewers and the editor of *ReCALL* for their constructive comments. Of course any errors remain the responsibility of the authors.

References

- Adair-Hauck, B., Willingham-McLain, L and Youngs, B.E. (1999) Evaluating the integration of technology and second language learning. *CALICO Journal*, **16**(2): 269–305.
- Allum, P. (2002) CALL and the classroom: the case for comparative studies. *ReCALL*, **14**(1): 146–166.
- Ayres, R. (2002) Learner attitudes towards the use of CALL. *Computer Assisted Language Learning*, **15**(3): 241–249.

- Chapelle, C. (1998) Multimedia CALL: Lesson to be learned from research on instructed SLA. *Language Learning Technology*, **2**(1): 22–34.
- Chapelle, C. (2000) *Computer Application in Second Language Acquisition*. Cambridge: University Press.
- Chapelle, C. and Hegelheimer, V. (2000) Methodological issues in research on learner-computer interactions in CALL. *Language Learning & Technology*, **4**(1): 41–59.
- Clark, R.E. (1994) Media will never influence learning. *Educational Technology Research and Development*, **42**(2): 21–29.
- Debski, R. and Gruba, P. (1999) A Qualitative survey of tertiary instructor attitude towards project-based CALL. *Computer Assisted Language Learning*, **12**(3): 219–239.
- Doty, D., Popplewell, S. and Byers, G. (2001) Interactive CD-ROM storybooks and young readers; reading comprehension, *Journal of Research on Computing in Education*, **33**(4): 374–384.
- Dunkel, P. (1991) *Computer-assisted language learning and testing: Research issues and practice*. New York: Newbury House.
- Echavez-Solano, N. (2003) A comparison of student outcomes and attitudes in technology-enhanced vs. traditional second-semester Spanish language course. *Unpublished PhD thesis*, The University of Minnesota.
- Hird, B. (1995) How communicative can English language teaching be in China? *Prospect*, **10**(3): 21–27.
- Holmes, B. (1998) Initial Perceptions of CALL by Japanese University Students. *Computer Assisted Language Learning*, **11**(4): 397–409.
- Johnson, E.M. and Brine, J.W. (2000) Design and Development of CALL Courses in Japan. *CALICO Journal*, **17**(2): 251–268.
- Kern, R.D. (1995) Restructuring Classroom Interaction with networked computers: Effects on quantity and characteristics of language production. *The Modern Language Journal*, **79**(4): 457–476.
- Lawrence, G. and Lam, Y. (2002) Teacher-students role redefinition during a computer-based second language project: Are computers catalysts for empowering change? *Computer Assisted Language Learning*, **15**(3): 295–313.
- Levy, M. (2000) Scope, goals and methods in CALL research: Questions of coherence and autonomy. *Computer Assisted Language Learning*, **12**(2): 170–195.
- Levy, M. (2001) Coherence and direction in CALL research: comparative designs. In: Cameron, K. (ed.), *C.A.L.L. – The challenge of change*. Exeter: Elm bank publication, 5–13.
- Levy, M. (1997) *Computer-Assisted Language Learning: Context and Conceptualization*. Oxford: Clarendon.
- Lewis, R. and Atzert, S. (2000) Dealing with computer-related anxiety in the project oriented CALL classroom. *Computer Assisted Language Learning*, **13**(4): 377–395.
- Lim, K. (2000) The attitudes of Korean students to learning English in Australia. *Unpublished Master thesis*, The University of Melbourne.
- Matthew, K.I. (1997) A comparison of the influence of interactive CD-ROM storybooks and traditional print storybooks on reading comprehension. *Journal of Research on computing in Education*, **29**(3): 263–275.
- Meunier, L.E. (1999) Personality and motivational factors in computer-mediated foreign language communication. In: Muyskens, J. (ed.), *New ways of learning and teaching: focus on technology and foreign language education*. Boston, Mass: Heinle & Heinle Publishers, 145–197.
- Nunan, D. (1989) *Designing tasks for the communicative classroom*. New York: Cambridge University Press.
- Oxford, R. (1990) *Language learning strategies: What every teacher should know*. Boston: Heinle

- & Heinle Publishers.
- Oxford, R. (1993) Language learning strategies in a nutshell: Update and ESL suggestions. *TESOL Journal*, Winter: 18–22.
- O'Malley, M. and Chamot, A.U. (1990) *Language strategies in second language acquisition*. Cambridge: Cambridge University Press.
- Pallant, J. (2001) *SPSS survival manual: A step by step guide to data analysis using SPSS for windows (version 10)*. St Leonards, NSW: Allen & Unwin.
- Pederson, K.M. (1987) Research on CALL. In: Smith, W. F. (ed.), *Modern media in foreign language education: Theory and implementation*. Lincolnwood, Ill., USA: National Textbook Co., 99–132
- Stepp-Greany, J. (2002) Student perceptions on language learning in a technological environment: implication for the new millennium. *Language learning and Technology*, **6**(1): 165–180.
- Strambi, A. (2001) The interaction of web-based interaction and collaboration on the language learner. *Unpublished PhD thesis*, The University of Sydney.
- Sullivan, N. and Pratt, E. (1996) A comparative study of two ESL writing environments: a computer-assisted classroom and a traditional oral classroom. *System*, **29**(4): 491–501.
- Warschauer, M. (1996) Motivational aspects of using computers for writing and communication. In: Warschauer, M. (ed.), *Telecollaboration in foreign language learning*. Honolulu, Hawaii: Second language Teaching & Curriculum Centre, 29–46.
- Warschauer, M. (2000) The changing global economy and the future of English teaching. *TESOL Quarterly*, **34**(3): 511–535.
- Williams, M. and Burden, R.L. (1997) *Psychology for language teachers: A social constructivist approach*. Cambridge: Cambridge University Press.
- Zhong, Y.X. and Shen, H.Z. (2002) Where is the technology-induced pedagogy? Snapshots from two multimedia EFL classroom. *British Journal of Educational Technology*, **33**(1): 39–52.