
Learning Foreign Language through an Interactive Multimedia Program: An Experimental Study on the Effects of the Relevance Component of the ARCS Model

MEI-MEI CHANG

National Pingtung University of Science and Technology

JAMES D. LEHMAN

Purdue University

ABSTRACT

This experimental study investigated effects of intrinsic motivation and embedded relevance enhancement within a computer-based interactive multimedia (CBIM) lesson for English as a foreign language (EFL) learners. Subjects, categorized as having a higher or lower level of intrinsic motivation, were randomly assigned to learn concepts related to criticism using a CBIM program featuring English language text, videos, and exercises either with or without enhanced relevance components. Two dependent variables, comprehension, as measured by a posttest, and perceptions of motivation, as measured by the Modified Instructional Material Motivation Survey (MIMMS), were assessed after students completed the CBIM program. Two-way ANOVA was used to analyze the collected data. The findings indicated that (a) the use of relevance enhancement strategies facilitated students' language learning regardless of learners' level of intrinsic motivation, (b) more highly intrinsically motivated students performed better regardless of the specific treatments they received, (c) the effects of the two variables were additive; intrinsically motivated students who learned from the program with embedded instructional strategies performed the best overall, and (d) there was no significant interaction between the two variables.

KEYWORDS

EFL Learners, Intrinsic Motivation, Relevance Enhancement, Instructional Strategy, Interactive Multimedia

INTRODUCTION

Traditionally, schools have relied heavily on extrinsically motivated behavior (Brown, 1994). Standardized tests, exams which have been given high authority, are often used to drive student performance. In most countries that teach



English as a foreign language, school-level instruction does not emphasize the function of English as a tool for communication (Berns, 1990) but instead focuses on knowledge of grammatical forms and structures that are often assessed on exams. As a consequence, students work hard to try to pass the exam in order to please teachers and parents rather than develop an internal thirst for knowledge and experience. It is not surprising that students often lose interest in English learning as a result. Even after years of study, few foreign language learners are competent to communicate freely with native speakers. It is incumbent upon EFL teachers to provide students with authentic, functional, interactive, and constructive language learning environments to reduce students' anxiety, raise their motivation, and increase their confidence.

Second language acquisition (SLA) researchers and education experts have pointed out that individual differences such as learners' affective domain, learners' motivational orientations (Brown, 1994; Pintrich & De Groot, 1990), and instructional strategies (Brown, 1993; Keller & Suzuki, 1988) perform significant roles in language teaching and learning. Recently, communicative language teaching (CLT) researchers have suggested that communicative approaches are needed in language teaching and learning (Angelis & Henderson, 1989; Berns, 1990; Savignon, 1997; Underwood, 1984). Among pedagogical techniques that can help accomplish the ultimate goal of communicative language teaching, Brown (1993) has suggested the utilization of technology such as films, videos, and computers. Computer-based interactive multimedia (CBIM) is an instructional approach that integrates computer-assisted instruction and interactive multimedia which can help students develop the various competencies mobilized in communication (Chanier, 1996).

This study investigated effects of level of learners' intrinsic motivation and use of embedded motivational strategies with an enhanced-relevance component in a computer-based interactive multimedia program for English as a foreign language learning. Two major dependent variables, learners' achievement and learners' perception of motivation, were examined as well as the interaction between these two factors.

BACKGROUND

Computer-assisted language learning (CALL) has been greeted with attention in the field of foreign language learning since the introduction of computer technology to education. Computer-based interactive multimedia (CBIM), a delivery system that combines computer-assisted instruction and interactive multimedia, lies at the core of language learning technology because it can integrate audiovisual capabilities with materials presentation and storage, which adds more power to traditional CALL programs.

Because of the features such as learner control, instant feedback, and use of authentic materials, CBIM provides learners with an environment that can satisfy the needs for exploration, manipulation, stimulation, knowledge to resolve problems, and self-enhancement. Learners' motivations have been found to be



improved in a constructivist learning environment using technology (Chung, 1991; Guthrie & Richardson, 1995; Scardamalia & Bereiter, 1991). Researchers also have pointed out that language learners can benefit from the audiovisual and textual resources found within computer applications to develop the various competencies used in communication (Chanier, 1996; Murray, Morgenstern, & Furstenberg, 1991).

Motivation and The ARCS Model

Many studies of human learning have shown that motivation is a key to learning (Crookes & Schmidt, 1991). Psychologists also consider motivation as one of the major determinants of academic achievement and work productivity (Keller, 1987a). Motivation is the most frequently used explanation for success or failure in completing any complex task and has been considered a pivotal concept in most theories of learning. Researchers have indicated that it is very important to examine the individual differences in student motivation in order to describe and understand the connection between students' personal characteristics and academic achievement (Pintrich & De Groot, 1990; Snow, 1990).

Maslow (1970) clearly indicated that intrinsic motivation is superior to extrinsic motivation according to his hierarchy of human needs. Crookes and Schmidt (1991) and Brown (1990) also indicated that more and more research findings strongly favored intrinsic motivation. How the teacher or instructional designer can motivate non-intrinsically motivated learners and help them learn better is an issue to be resolved.

Keller (1979) believed that external conditions could be successfully constructed to facilitate and increase learner motivation. Based on this notion, Keller (1984, 1987a) integrated several learning theories and developed the ARCS (Attention, Relevance, Confidence, and Satisfaction) model. Attention refers to the extent to which learners' curiosity is aroused and sustained over time. Relevance refers to learners' perception that the instruction is related to personal needs or goals. Confidence describes learners' perceived likelihood of achieving success through personal control. Satisfaction refers to the combination of extrinsic rewards and intrinsic motivation and the consistency of expectations with outcomes (Keller, 1983; Keller, 1987a).

The present study focuses on relevance, the second element of the ARCS motivational model. The general motivational condition related to relevance is that personal motivation will increase with an increase in the perceived likelihood that a task will satisfy a basic need, motive, or value (Keller, 1983). Research has indicated that learners' sense of relevance increases their use of cognitive strategies that improve learning on a variety of achievement measures (McKeachie, Pintrich, & Lin, 1985; Pintrich, 1989); relevance enhances meaningfulness and academic performance (Means, Jonassen, & Dwyer, 1997); and relevant phenomena better fulfill personal needs or goals, thus enhancing effort and subsequently performance (Means, Jonassen, & Dwyer, 1997). Herndon's



(1987) study showed that students are more motivated and perform better on achievement assessments when they are given instruction that is relevant to them. Students are more likely to learn while the content of the instruction is perceived to be helpful to accomplish an important goal (Dweck & Elliott, 1983; Schunk, 1989). Keller and Kopp (1987) argued that embedding relevance strategies can improve motivation and performance. Nwagbara (1993) reported positive findings about building a relevance component in instructional material to improve learners' motivation.

In this experimental study, a motivational strategy designed to enhance relevance was built into a computer-based interactive multimedia program for English as a foreign language (EFL) learners based on instructional design principles as well as second language acquisition theory and assumptions. The learners' motivational perception of the instructional materials and academic performance were examined.

This research was designed to answer the following questions:

1. When learning from a CBIM program, do EFL students who score higher on a measure of intrinsic motivation achieve higher scores on a comprehension test and on a measure of perceptions of motivation than students who score lower on a measure of intrinsic motivation?
2. Do EFL students learning from a CBIM program with an embedded relevance motivational strategy achieve higher scores on a comprehension test and on a measure of perceptions of motivation than students learning from a CBIM program without an embedded relevance motivational strategy?
3. Do EFL students who both score higher on a measure of intrinsic motivation and learn from a CBIM program with an embedded relevance motivational strategy achieve the highest scores on the comprehension test and on a measure of perceptions of motivation overall?
4. Is there an interaction between the level of intrinsic motivation and the effect of embedded relevance motivational strategy on either the comprehension test or measure of perceptions of motivation?

METHOD

This study followed a 2 X 2 factorial experimental design. Two categorical independent variables, level of intrinsic motivation (higher or lower) and embedded relevance enhancement (with or without), and two continuous dependent variables, achievement and motivation perception, were employed in this study.



Subjects and Sampling Method

The participants were students recruited from a university in southern Taiwan in the fall of 2000. They came from different majors, including engineering, agriculture, and management. The participants were around 19-22 years old. They had been studying English for at least six years (including three years in junior middle school and three years in high school). A total of 313 complete sets of data were collected. This size sample was adequate to detect a medium effect size with an $\alpha = .05$ and statistical power $> .70$ (Hopkins, 1998).

Instructional Materials

The instructional program was designed for web-based delivery, and the content was adapted from the videotape entitled *The Arts of Criticism—Giving and Taking* produced by Katola Production Company (1993). The main purpose of this program was to teach learners how to deal with an important issue, criticism, in English and to promote learners' communicative competence. The program was created using *FrontPage*, HTML, and *Dreamweaver* and was designed for access via *Internet Explorer*.

Two versions of the instructional program were created: one with embedded relevance strategies and the other without. In order to make sure that no extraneous variables would affect the result, the structure of the two different versions of the program was the same except for the embedded relevance strategy. The total length of the video component of the program for both groups was around 12 minutes. Total instructional time was about 75-80 minutes.

The relevance-enhanced materials were designed by embedding strategies based on the Relevance Concept and Tactics Checklist developed by Keller (1990). Under the checklist's goal orientation category, present worth relates to the immediate benefit of the instruction, and future value addresses how this instruction will improve learners' general life-coping skills. Under motivation matching, strategies include basic motive stimulation and role models. Basic motive stimulation includes using personal language to make learners feel as though they are talking to a person, exercises that allow for feedback, and activities that stimulate problem solving. Role models relate to examples from people who attained further goals after successfully completing the instruction. Familiarity includes connection to previous experience and options for individualization. A statement about how the instruction builds on learners' existing skills or knowledge is one of the connections to previous experience strategies.

In the project, goal orientation and familiarity tactics were placed at the beginning of instruction and when introducing a new concept. Motive matching was placed whenever appropriate throughout the instruction. Table 1 shows a sample of how goal orientation and motive matching were placed in the version of the CBIM lesson used by participants in the experimental group compared to the version used by those in the control group.



Table 1
Sample Comparison of the Control Group Version and the Experimental Group Version

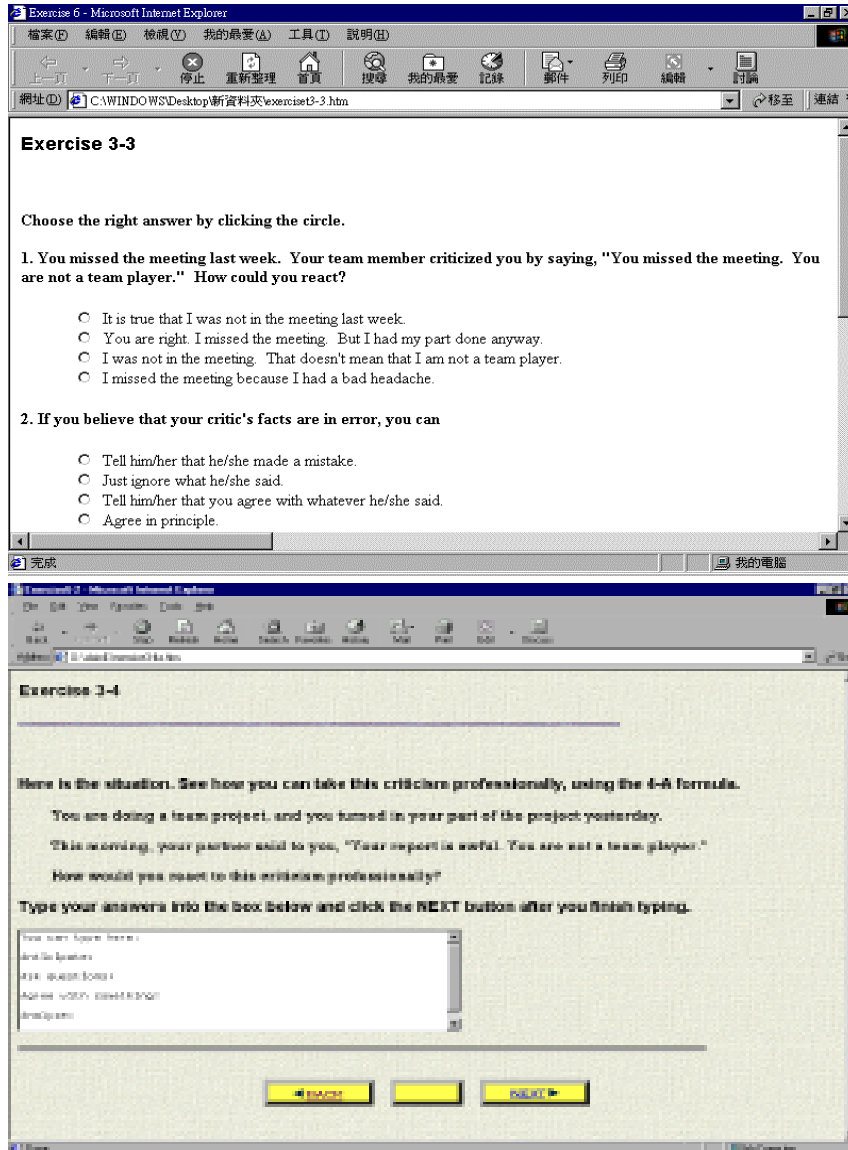
Introduction (Control Group)	Introduction (Experimental Group)
<p>This is a story about Joan, Everett, and Beverly who work in the same company. The company designs and sells the products. Everett and Beverly both are very good at their jobs. One day, they had a problem and a very bad argument about production sales and that made them both miserable. Joan, their manager, tried to help them. Finally, they solved the problem.</p> <p>There are five sections in this program: The Introduction, The Conflict, The Arts of Giving Criticism, The Arts of Taking Criticism, and The Conclusion. Practice exercises are displayed after each section.</p> <p>After finishing the program, there are questions based on the content of this program. Please watch carefully.</p>	<p>Have you ever given criticism or taken criticism? Did you criticize others professionally and tactfully? Did you feel uncomfortable when hearing criticism? (R2)</p> <p>Both giving criticism and taking criticism are not easy because most of us are sensitive to criticism.</p> <p>The purpose of this program is to teach you techniques that can help you to maximize learning and communication when giving and taking criticism in English. (R1)</p> <p>Today, I am sharing with you the story (R2) of Beverly and Everett; both are very good at their jobs. However, they had a problem and a very bad argument about production sales and that made them both miserable. We will identify and practice skills for giving and taking criticism. (R1)</p> <p>After finishing this program, you will walk away with skills that can help you both improve English communication ability and be more tactful and professional in the real world. (R1)</p>

Note: **R1** (Goal Orientation) stated the immediate benefit of the instruction and described what the learner would be able to do after finishing the instructional materials. **R2** (Motive Matching) used personal language to make the learner feel that he/she was being talked to as a person.

Figure 1 shows a sample from the lesson with relevance enhancement based on both goal orientation and motivation-matching tactics. Figure 2 shows an exercise based on basic motive stimulation designed to stimulate problem solving.



Figure 2
Sample Exercises with Relevance Enhancement



Instruments

Three instruments were used in this study: the Intrinsic Motivation Orientation Scale (IMOS), a comprehension test, and the Modified Instructional Material Motivation Survey (MIMMS). Table 2 lists sample items from the three instruments.



Table 2
Sample Items from the IMOS, Comprehension Test, and MIMMS

IMOS	I believe that I can learn English well. I do not like learning English because it takes me a lot of time. I always get bored when learning English. I work hard because I want to improve my English ability.
Comprehension Test	1. Once you have told the problems, you want to solve the problem by opening a discussion or a negotiation to make the situation improved. This is: (a) Communication (b) Move away the problem (c) Move forward 2. Read the scenario and apply what you have learned from this program to give a tactful criticism. (Using EPM formula) MuLan, your roommate, often comes back very late and takes a shower at midnight. You have an early morning class so you have to get up very early in the morning. This situation has bothered you for several weeks. Recently, you are especially upset because she even turned on the radio when she was taking the shower. How would you handle this situation?
MIMMS	1. When I first looked at this lesson, I had the impression that it would be easy for me. 2. There was something interesting at the beginning of this lesson that got my attention. 3. This material was more difficult to understand than I would like for it to be. 4. After reading the introductory information, I felt confident that I knew what I was supposed to learn from this lesson.

The IMOS was developed by the researchers to assess learners' motivation orientation. This 35-item inventory was composed of items designed to determine learners' motivation: higher level of intrinsic motivation or lower level of intrinsic motivation. Based on the definition of intrinsic motivation by Deci (1975), items designed to assess learners' motivation to learn English were created. Participants responded to the questionnaire items using a five-point Likert-type scale ranging from strongly agree to strongly disagree. (The overall Cronbach alpha coefficient of reliability was .93.) The target learners for this study were non-English major EFL college students, and all the participants were grouped according to their IMOS score before they started the program.

Based on the content of the CBIM program, a comprehension test was devel-



oped by the researchers. Since the purpose of the program was to help learners improve their communicative competence, the test focused on examining communication skills. Most of the questions focused on how well the learners understood the main idea of the program rather than how much detailed information they remembered. The test included 20 multiple choice and two problem solving applications. For multiple-choice questions, each correct answer was awarded 1 point. For problem-solving questions, the highest possible score was 3 points for the giving-criticism item and 4 points for the taking-criticism item. The total score for the test was 27 points. (The interrater reliability was .96, and the Cronbach alpha of the comprehension test was .67.)

The Modified Instructional Material Motivations Survey was based on the IMMS, originally developed by Keller (1984). The researchers requested and obtained permission from the author to use the updated version of IMMS (Keller, 1993) for this study. The IMMS was intended to be a situational measure of students' motivational reactions to instructional materials. It was designed in accordance with the theoretical foundation of the ARCS model (Keller, 1987a, 1987b) derived, in turn, from the literature on human motivation. The Modified Instructional Material Motivation Scale (MIMMS) Chinese version was used in this study to measure learners' motivation perception and consisted of 34 items. Because the study was designed to focus on the relevance component, the researchers added two items to the relevance subscale and removed four from the attention subscale. (Cronbach alpha for the MIMMS was .94 for the total scale, .83 for the attention subscale, .87 for the relevance subscale, .86 for confidence subscale, and .80 for the satisfaction subscale.)

Procedure

Prior to use of the CBIM program, subjects were administered the Chinese version of IMOS. Scores ranged from 61 to 174 with a mean score of 127.67 (SD of 17.66) and a median of 127. Students were separated into two groups by the median score; students who scored in the range 128-174 were classified as the Higher Level of Intrinsic Motivation group ($n = 155$), and students who scored in the range 61-127 were placed in the Lower Level of Intrinsic Motivation group ($n = 158$). A t-test was used to check for differences of IMOS scores between Higher Level of Intrinsic Motivation group and Lower Level of Intrinsic Motivation group and confirmed that the IMOS means of the two groups differed significantly ($t = 21.23$, $p = 0.0001$).

The participants from each of the two groups were then randomly assigned to one of the two different treatments with roughly equal numbers of participants in each group. All the participants were thus classified into one of four groups: Group HC, the Higher Level of Intrinsic Motivation without Embedded Relevance Enhancement (control) group; Group HE, the Higher Level of Intrinsic Motivation with Embedded Relevance Enhancement (experimental) group; Group LC, the Lower Level of Intrinsic Motivation without Embedded Rel-



evance Enhancement (control) group; Group LE, the Lower Level of Intrinsic Motivation with Embedded Relevance Enhancement (experimental) group.

The participants used the CBIM program in groups. In order to minimize the history threat to validity, all the participants were scheduled to complete the program within a two-week period. The comprehension test and the MIMMS were administered immediately after the treatment. To eliminate threats to internal validity, participants were asked not to discuss the CBIM program content with each other until the whole experiment ended; all the participants were asked to complete the CBIM program and comprehension test in the same day.

Results

The comprehension test means for each of the four treatment groups are shown in Table 3.

Table 3
Comprehension Test Means (SDs) for All Four Groups

Table with 4 columns: Treatments, Level of Intrinsic Motivation (Higher, Lower, Combined), and Mean (SD). Rows include Enhanced Relevance (With/Without) and Combined groups.

Comparison of scores by Level of Intrinsic Motivation reveals that the Higher Level of Intrinsic Motivation group mean of 11.97 was higher than the Lower Level of Intrinsic Motivation group mean of 10.47 in both the control and experimental conditions. When comparing means by treatments, the experimental group mean of 12.75 was higher than the control group mean of 9.63. That is, in spite of different levels of intrinsic motivation, subjects who received embedded relevance enhancement obtained higher scores on the comprehension test than subjects who did not receive embedded relevance enhancement.

The results of the MIMMS for each of the four groups are shown in Table 4. The Higher Level of Intrinsic Motivation group mean of 125.63 was greater than the Lower Level of Intrinsic Motivation group mean of 113.85. The mean for the Embedded Relevance Enhancement group of 123.10 was greater than the mean for the control group of 116.21.



Table 4
The MIMMS Means (SDs) for All Four Groups

Treatments		Level of Intrinsic Motivation		Combined
		Higher	Lower	
Enhanced Relevance	With (experimental)	n = 79 M = 130.62 (15.19)	n = 79 M = 115.58 (16.45)	n = 158 M = 123.10 (17.49)
	Without (control)	n = 76 M = 120.43 (15.26)	n = 78 M = 112.10 (14.64)	n = 154 M = 116.21 (15.48)
	Combined	n = 155 M = 125.63 (16.01)	n = 157 M = 113.85 (15.63)	

ANALYSIS

A two-way ANOVA was employed to test the research hypotheses. The SAS GLM procedure was used because of unbalanced group size. Overall, the statistical results indicate that there were significant differences among groups on both the Comprehension Test [$F(3, 309) = 18.25, p = .0001$] and the MIMMS [$F(3, 308) = 21.50, p < .0001$] (see Tables 5 and 6).

Table 5
Two-Way GLM ANOVA for Comprehension Test

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between groups	3	932.14	310.71	18.25	.0001
Within groups	309	5260.48	17.02		
Total	312	6192.62			
Breakdown of effects					
	<i>df</i>	<i>Type III SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Level of intrinsic motivation	1	172.54	172.54	10.13	.0016
Level of relevance enhancement	1	756.97	756.97	44.46	.0001
LOIM*LORE	1	.13	.13	.01	.93

Note: LOIM*LORE = Interaction between Level of Intrinsic Motivation and Embedded Relevance Enhancement.



Table 6
Two-Way GLM ANOVA for the MIMMS

Source	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Between groups	3	15303.61	5101.20	21.50	.0001
Within groups	308	73069.67	237.24		
Total	311	88373.28			

Breakdown of effects					
	<i>df</i>	<i>Type III SS</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Level of intrinsic motivation	1	10647.05	10647.05	44.88	.0001
Level of relevance enhancement	1	3640.77	3640.77	15.35	.0001
LOIM*LORE	1	876.79	876.79	3.70	.0555

Note: LOIM*LORE = Interaction between the Level of Intrinsic Motivation and the Embedded Relevance Enhancement.

For the comprehension test, there was a significant difference between the two levels of Intrinsic Motivation ($F = 10.13, p = 0.0016$) as well as between the two levels of Embedded Relevance Enhancement ($F = 44.46, p = 0.0001$). The interaction between levels of Intrinsic Motivation and levels of Embedded Relevance Enhancement was not significant ($F = .01, p = .93$). The results show that there was a significant main effect of the Level of Intrinsic Motivation and a significant main effect of the Embedded Relevance Enhancement on the comprehension test. Students with higher levels of intrinsic motivation obtained higher scores (LSM = 11.94) than students with lower levels of intrinsic motivation (LSM = 10.45). Students who learned from the embedded relevance enhancement program (LSM = 12.75) outperformed the students who learned from the no embedded relevance enhancement program (LSM = 9.64). There was no interaction effect between Level of Intrinsic Motivation and Embedded Relevance Enhancement on the comprehension test.

For motivation perception, the results showed that there was a significant difference between the two levels of Intrinsic Motivation ($F = 44.88, p = 0.0001$) as well as between the two levels of Embedded Relevance Enhancement ($F = 15.35, p = 0.0001$) on the MIMMS (see Table 6 above). The interaction between Level of Intrinsic Motivation and Embedded Relevance Enhancement on the MIMMS was not significant ($F = 3.70, p = 0.0555$). Results indicated that there were significant main effects of Level of Intrinsic Motivation and Relevance Enhancement on the MIMMS. The MIMMS mean of the Higher Level of Intrinsic Motivation group (LSM=125.53) was greater than that of the Lower Level of Intrinsic Motivation group (LSM=113.84). Students who learned from the embedded relevance enhancement program (LSM= 123.10) outperformed stu-



dents who learned from the program without embedded relevance enhancement (LSM = 116.27) on the MIMMS. The interaction effect between the Level of Intrinsic Motivation and the Level of Embedded Relevance Enhancement on motivation perception was small and not statistically significant.

DISCUSSION

The results of data analyses showed positive findings in the testing of the research hypotheses. The findings include

1. There was a significant main effect of Level of Intrinsic Motivation on the scores of both the comprehension test and the motivation perception survey. Students who scored higher on a measure of intrinsic motivation achieved higher scores than students who scored lower on a measure of intrinsic motivation when learning from a CBIM program.
2. The main effect of Embedded Relevance Enhancement was significant on scores of both the comprehension test and the motivation perception survey. Students who learned from a CBIM program with an embedded relevance motivational strategy achieved higher scores than students who learned from a CBIM program without an embedded relevance motivational strategy.
3. The effects of the two variables were additive. Students who both scored higher on a measure of intrinsic motivation and learned from a CBIM program with an embedded relevance motivational strategy achieved the highest scores on the comprehension test and on the motivation perception survey.
4. There was no statistically significant interaction between the level of intrinsic motivation and the embedded relevance motivational strategy on the comprehension test or on the motivation perception survey.

The findings are in line with existing learning theories and practice that have claimed that intrinsic motivation is superior to extrinsic motivation (Brown, 1990; Crookes & Schmidt, 1991; Maslow, 1970). Learners who are intrinsically oriented learn more and are more highly motivated when learning. The findings also support Keller's (1983, 1987a, 1987b) declaration that embedded instructional strategies can enhance learners' motivation and cognitive performance. The results might be explained by recent research which has indicated that learners' sense of relevance increases their use of cognitive strategies that improve learning (McKeachie, et al., 1985; Pintrich, 1989) and enhances academic performance (Mean, et al., 1997).

Suggestions

EFL teachers may draw implications for classroom practice from these findings. To enhance learners' intrinsic motivation, teachers can deliver feedback in



the classroom; provide content-based teaching, such as English for specific purposes or English for the workplace, and design different kinds of assignments that engage students in cooperative learning instead of competition in instructional activities (Brown, 1994). Brown also suggested that, instead of tests and exams, the use of peer evaluation, self-diagnosis, and level-check exercises could enhance students' intrinsic motivation. In addition, teachers should get a "never fail" notion out of students' minds and encourage them to take risks, to innovate, and to be creative. Teachers can help students set their personal goals, short term and long term, to motivate them to achieve self-actualization and strive for self-esteem and fulfillment.

The positive finding of relevance enhancement should encourage both EFL teachers and courseware designers. EFL teachers can enhance relevance in many ways: talking with students as people, relating instruction to students' daily lives, pointing out how the instructional materials can be used in the real world or in students' lives in the future, assigning a real world connected task for students to complete, and providing problem-solving exercises (Keller, 1983). Courseware designers can integrate relevance concepts into different materials using various media. Relevance tactics are adoptable for various formats of materials and for different modalities of language instruction. Because of the accessibility of CBIM learning programs, students who feel like spending more time on the program can engage in additional practice. Without the pressure of time limitation, students can be more motivated because of lower anxiety. Also, because of the availability of web sites, the program can be accessed from different places. Courseware designers should make good use of this feature. Further studies are recommended to try out various instructional strategies to develop learners' intrinsic motivation and to facilitate their learning. Learners' characteristics other than intrinsic motivation should also be examined.

CONCLUSION

The results of the study presented here indicate that appropriately constructed CBIM instructional material with embedded relevance enhancement can benefit EFL students' learning. The results also show that a higher level of intrinsic motivation benefits learning. The combination of the two variables had a greater effect than either one alone. This finding implies that the combination of improving learners' intrinsic motivation and appropriate external instructional strategies together may benefit learners most.

EFL teachers should realize that every technique in language classrooms can be enhanced by an effective strategy, which does not need to be outstanding or inspirational. Everyday classroom practice can be very motivating through teachers' careful design of techniques. A small talk with personal language that inspires students' thinking about personal goals when checking homework, an exercise with feedback, cooperative work, or a game that can stimulate problem solving can increase students' motivation.

The integration of technology into EFL classes had a positive effect on learn-



ing outcomes in this study. We can infer from this that it is important that EFL teachers take the first step to integrate technology into classroom instruction. However, it is very important to keep in mind that technology itself cannot help students learn better without effective instructional design. EFL teachers, as well as courseware designers, must realize that the applicability of technology depends on effective pedagogical strategies to produce an effective language learning environment. As CALL represents itself clearly, it is “computer-assisted language learning,” not “computer-assured language learning.” A comprehensive instructional design is critically important. The success of any instruction depends on a complete, methodical, well planned instructional design.

REFERENCES

- Angelis, P., & Henderson, T. (Eds.). (1989). Communicative competence revisited: Selected papers from the proceedings of the BAAL/AAAL joint seminar [Special issue]. *Applied Linguistics*, 10.
- Berns, M. (1990). *Contexts of competence: Social and culture consideration in communicative language teaching*. New York: Plenum Press.
- Brown, H. D. (1990). M & Ms for language classroom? Another look at motivation. In J. Alatis (Ed.), *Georgetown university round table on languages and linguistics* (pp. 383-393). Washington, DC: Georgetown University Press.
- Brown, H. D. (1993). *Principles of language learning and teaching*. Englewood Cliffs, NJ: Prentice Hall.
- Brown, H. D. (1994). *Teaching by principles: An interactive approach to language pedagogy*. Englewood Cliffs, NJ: Prentice Hall.
- Chanier, T. (1996). Learning a second language for specific purposes within a hypermedia framework. *Computer Assisted Language Learning*, 9 (1), 3-43.
- Chung, J. (1991). Collaborative learning strategies: The design of instructional environments for the emerging new school. *Educational Technology*, 31 (12), 15-22.
- Crookes, G., & Schmidt, R. W. (1991). Motivation: Reopening the research agenda. *Language Learning*, 41, 469-512.
- Deci, E. L. (1975). *Intrinsic motivation*. New York: Plenum Press.
- Dweck, E., & Elliott, G. (1983). Achievement motivation. In P. H. Mussen (Ed.), *Handbook of child psychology*, 4 (pp. 643-691). New York: Wiley & Sons.
- Guthrie L. F., & Richardson, S. (1995). Turned on to language arts: Computer literacy in the primary grades. *Educational Leadership*, 53 (2), 14-17.
- Herndon, J. N. (1987). Learner interests, achievement, and continuing motivation in instruction. *Journal of Instructional Development*, 10 (3), 11-14.
- Hopkins, K. (1998). *Educational and psychological measurement and evaluation*. Englewood Cliffs, NJ: Prentice Hall.
- Keller, J. M. (1979). Motivation and instructional design: A theoretical perspective. *Journal of Instructional Development*, 2 (4), 26-34.



- Keller, J. M. (1983). Motivation design of instruction. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: An overview of their current status* (pp. 383-434). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Keller, J. M. (1984). The use of the ARCS model of motivation in teacher training. In K. E. Shaw (Ed.), *Aspects of educational technology, XVII: Staff development and career updating*. London: Kogan Page.
- Keller, J. M. (1987a). Development and use of the ARCS model of instructional design. *Journal of Instructional Development*, 10 (3), 2-10.
- Keller, J. M. (1987b). Strategies for stimulating the motivation to learn. *Performance & Instruction*, 26 (8), 1-7.
- Keller, J. M. (1990). *Motivational tactics checklist*. Unpublished materials, Florida State University.
- Keller, J. M. (1993). *Instructional material motivation survey*. Unpublished materials, Florida State University.
- Keller, J. M., & Kopp, T. W. (1987). Application of the ARCS model to motivational design. In C. M. Reigeluth (Ed.), *Instructional theories in action: Lessons illustrating selected theories* (pp. 289-320). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Keller, J. M., & Suzuki, K. (1988). Use of the ARCS model in courseware design. In D. H. Jonassen (Ed.), *Instructional designs for microcomputer courseware* (pp. 401-434). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Maslow, A. H. (1970). *The whole world guide to language learning*. Yarmouth, ME: Intercultural Press.
- McKeachie, W. J., Pintrich, P. R., & Lin, Y. (1995). Teaching learning strategies. *Educational Psychologist*, 20, 153-160.
- Means, T. B., Jonassen, D. H., & Dwyer, F. M. (1997). Enhancing relevance: Embedded ARCS strategies vs. purpose. *Educational Technology Research & Development*, 45 (1), 5-17.
- Murray, J. H., Morgenstern, D., & Furstenberg, G. (1991). The Athena language-learning project: Design issues for the next generation of computer-based language-learning tools. In W. F. Smith (Ed.), *Modern technology in foreign language education: Applications and projects* (pp. 97-118). Lincolnwood, IL: National Textbook Company.
- Nwagbara, C. (1993). *Effects of the relevance component of the ARCS model of motivational design*. Unpublished dissertation, Purdue University, West Lafayette.
- Pintrich, P. R. (1989). A process-oriented view of student motivation and cognition. In J. Stark & L. Mets (Eds.), *Improving teaching and learning through research: New direction for instructional research*, 57 (pp. 65-79). San Francisco: Josey-Bass.
- Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology* 82 (1), 33-40.
- Savignon, S. J. (1997). *Communicative competence: Theory and classroom practice* (2nd ed.). New York: McGraw-Hill.



- Scardamalia, M., & Bereiter, C. (1991). Higher levels of agency for children in knowledge-building: A challenge for the design of new knowledge media. *The Journal of Learning Science*, 1 (1), 37-68.
- Schunk, D. J. (1989). Self-efficacy and cognitive skill learning. In R. Ames & C. Ames (Eds.), *Research on motivation in education: Goals and cognitions* (pp. 13-44). New York: Academic Press.
- Snow, R. (1990). Aptitude-treatment interaction as a framework for research on individual difference in learning. In P. Ackerman, R. Sternberg., & R. Glaser (Eds.), *Learning and individual differences* (pp. 13-59). New York: Freeman.
- Underwood, J. (1984). *Linguistics, computers, and the language teacher: A communicative approach*. Rowley, MA: Newbury House.

AUTHORS' BIODATA

Mei-Mei Chang is currently Associate Professor in the Department of Modern Languages at National Pingtung University of Science and Technology. Her research interests include student motivation theory and practice, computer-based language learning, and instructional design.

James D. Lehman is Professor of Educational Technology in the Department of Curriculum and Instruction at Purdue University. He teaches and conducts research on multimedia, distance learning, and educational applications of technology.

AUTHORS' ADDRESS

Mei-Mei Chang
National Pingtung University of Science and Technology
Pingtung, Taiwan 900
Phone: 886-8-7703202
Email: mmchang@mail.npust.edu.tw, meisquare@yahoo.com

Dr. James D. Lehman
Purdue University
1442 LAEB
West Lafayette, IN 47907-1442
Phone 765/494-5670
Email: lehman@purdue.edu