
Motivational Aspects of Using Computers for Writing and Communication

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Abstract

One of the purported benefits of computer-assisted instruction is that it increases student motivation. This study researched the effects on student motivation of using computers for writing and communication in the language classroom. A 30-question survey investigated the attitude toward using computers of 167 ESL and EFL students in 12 university academic writing courses in Hong Kong, Taiwan, and the U.S. It was found that the students overall had a positive attitude toward using computers and that this attitude was consistent across a number of variables, including gender, typing skill, and access to a computer at home. Further analysis showed that two variables in particular, self-reported knowledge of computers and amount of experience using electronic mail, correlated positively with student motivation. In addition, a factor analysis was performed on the survey questions, revealing three common factors of student motivation, labeled *communication*, *empowerment*, and *learning*. Finally, differences were found in student motivation among the 12 courses, and these differences were seen to be at due at least in part to the degree to which computer-based projects were integrated into the overall goals and structure of the course.

In recent years there has been a surge of articles re-examining the relationship of motivation to language learning (Crookes and Schmidt, 1991; Dornyei, 1994; Gardner and Tremblay, 1994a; Gardner and Tremblay, 1994b; Oxford, 1994; Oxford and Shearin, 1994; Pulvermuller and Schumann, 1994; Skehan, 1991). On the one hand some posit that the importance of motivation has been underestimated in the past; Schuman (Pulvermuller and Schumann, 1994) goes so far as to claim that motivation should be viewed as the single overriding variable determining language learning success in adults. On the other hand, there is a growing consensus (Crookes and Schmidt, 1991; Dornyei, 1994; Oxford and Shearin, 1994) that the traditional framework for explaining the nature of language learning motivation need expansion and refinement.

Three major inadequacies have been pointed out regarding the traditional framework for analyzing language learning motivation, which until recently has largely rested on the general categorization of motives as being instrumental (for practical benefit) vs. integrative (a desire to integrate into the target culture). First, this categorization is seen as too general and ill-defined (Au, 1988; Crookes and Schmidt, 1991; Oxford and Shearin, 1994; Skehan, 1989). Second, the categorization rests largely on social psychological theory rather than educational theory (Crookes and Schmidt, 1991). Third, the categorization is not pragmatic enough in that it doesn't provide educators much of a guide for making their teaching more motivating (Dornyei, 1994).

This paper seeks to contribute to the process of making motivational frameworks more particularized, pedagogical, and practical by examining the relationship between specific aspects of computer-assisted language learning and student motivation.

Computers and Motivation

The motivating aspects of learning with computers are widely touted, and there is a vast literature dealing with this issue (see for example Armour-Thomas, White, and Boehm, 1987; Brown, 1986; Chapelle and Jamieson, 1986; Fox, 1988; Hicken, Sullivan, and Klein, 1992; Kinzie, Sullivan, and

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Berdel, 1988; Mosley, 1984, January; Perez and White, 1985; Peterson and Sellers, 1992, October; Pollock and Sullivan, 1990; Relan, 1992; Waldrop, 1984; Williams, 1993; Wu, 1992). The most frequently-cited motivating aspects of computer-assisted instruction include (a) the novelty of working with a new medium (Fox, 1988), (b) the individualized nature of computer-assisted instruction (Relan, 1992), (c) the opportunities for learner control (Hicken, et al., 1992; Kinzie, et al., 1988; Pollock and Sullivan, 1990; Williams, 1993), and (d) the opportunities for rapid, frequent non-judgmental feedback (Armour-Thomas, et al., 1987; Waldrop, 1984; Wu, 1992).

While this body of research provides a basis for beginning to understand the potentially motivating aspects of CALL, two important limitations must be taken into consideration:

- (1) Much of this research has been devoted to computer-assisted instruction in general. Language learning involves numerous social, psychological, and cognitive aspects which are not present in other types of learning, and what motivates a language learner using computers might be very different than for learners studying other subjects.
- (2) Most research regarding the motivating affects of computer assisted instruction is outdated. New technologies popularized the last five years—in particular multimedia programs and computer-mediated communication—allow new ways of using computers in the classroom, and thus new ways of motivating students.

Writing and Communicating with Computers

This paper focuses on two particular aspects of computer-assisted language learning: using a computer for writing and for communication. Word processing in the second and foreign language classroom has been common for at least ten years. Many composition and language teachers believe that word processing encourages new pedagogical relationships in the class, by facilitating student revision and collaborative writing (for an excellent review, see Susser, 1992)

Computer-mediated communication (CMC), like word processing, also involves the use of the computer as a tool, rather than as a deliverer of instructional material. Many claim that CMC is the most revolutionary development in computer-assisted language learning, since it is the only one which involves direct human-to-human communication rather than human-to-machine (Barson, Frommer, and Schwartz, 1993; Cummins and Sayers, 1990; Warschauer, Turbee, and Roberts, 1994).

Among the earliest proponents of CMC for educational purposes were L1 composition teachers, who used computer conferencing among the students in a class to enhance collaborative writing and the social production of knowledge (see for example Batson, 1988; DiMatteo, 1990; Faigley, 1990; Hawisher and LeBland, 1992; Susser, 1993). These same computer conferencing techniques were later adapted by second and foreign language teachers, either for the teaching of writing (Sullivan, 1993) or for promoting general language development (Beauvois, 1992; Chun, 1994; Kelm, 1992; Kern, 1993). The use of electronic mail proved even more popular among language teachers, since it allowed for communication not only in a single class, but among learners and native speakers from different parts of the world (Barson, et al., 1993; Paramskas, 1993; Sayers, 1993; Soh and Soon, 1991).

One of the main alleged benefits of CMC is that it enhances student motivation, supposedly by providing students a less threatening means to communicate (Kelm, 1992; Kroonenberg, 1994/1995; Wang, 1993), providing stimulating international contact (Soh and Soon, 1991), and facilitating work on meaningful projects (Barson, et al., 1993; Vilmi, 1995).

While many have claimed the motivational benefits of second language student use of computers for writing and communication, few empirical studies of this issue have yet been conducted (and, to this author's knowledge, none have been published.)

This study attempts to analyze this issue empirically by addressing the following questions:

RQ1: What aspects of using a computer for writing and communication do second/foreign language students find motivating?

RQ2: What differences exist among these motivating aspects for students of different backgrounds?

RQ3: How does student motivation vary from class to class, teacher to teacher, and from second language to foreign language situations?

Method

Informants

This study surveyed 167 university students in 12 ESL and EFL academic writing classes in the United States, Hong Kong, and Taiwan. All the classes had involved the use of computers for writing and communication. The classes were taught by seven different instructors, listed below as teachers A-G.

The following classes participated in the survey:

1. ESL Writing, Western University, U.S., Teacher A, 21 students out of 22 enrolled (one absent on day of survey)
2. Academic Writing Skills, Midwest University, U.S., Teacher B, 10 students out of 12 enrolled (two absent)
3. Academic Research Writing, Midwest University, U.S., Teacher B, nine students out of nine enrolled
4. Advanced Grammar and Composition, Eastern University, U.S., Teacher C, 14 students out of 15 enrolled (one absent)
5. Advanced Grammar and Composition, Eastern University, U.S., Teacher C, 11 students out of 11 enrolled
6. Technical Communications, Hong Kong University, Teacher D, 12 students out of 15 enrolled (three absent)
7. Technical Communications, Hong Kong University, Teacher D, eight students out of 12 enrolled (three absent, one turned in blank survey)
8. Technical Communications, Hong Kong University, Teacher E, 15 students out of 19 enrolled (four absent)
9. Technical Communications, Hong Kong University, Teacher E, 14 students out of 15 enrolled (one absent)
10. Thinking through Writing, Hong Kong University, Teacher E, 13 students out of 17 enrolled (four absent)

11. Composition and Oral Communication, Taiwan University, Teacher F, 15 students
12. Composition and Oral Communication, Taiwan University, Teacher G, 25 students¹

Instrument

The students were administered an anonymous survey in English divided into two parts. The first part gathered personal information including age, sex, country of birth, native language, year in school, self-rating of typing ability, self-rating of computer knowledge, whether the student had a computer at home and if so for how long, and amount of experience using word processing, e-mail, the World Wide Web and MOOs.²

The second part asked thirty questions related to the students' feelings about using computers. The first five questions were related to the use of computers for word processing. The next 11 were related to the use of computers for interpersonal communication. The final 14 queried general feelings about using computers.³

All 30 questions were answered on a five-point Likert scale, with 5 being the highest score. Eight of the questions were reverse coded.⁴ The entire survey is listed in the appendix.

Procedures

Each of the participating teachers distributed the survey during one normal class period. Student were given instructions indicating that the survey was anonymous and for the purposes of finding out how learners of English around the world feel about using computers. The survey questions were worded so they would be understandable to these university students, all of whom were at an intermediate level and above. Nevertheless, students were also told they could consult a dictionary or their teacher if there was any vocabulary they were unclear about.

Students who were absent on the day of the survey did not participate. Of the 168 students who were present during the day the survey was given out, one chose not to fill it out (submitting a blank form).

Analyses

First, a mean motivation score for each student was determined by calculating for each student the mean responses to all 30 questions.

Next, in order to determine which questions generated positive or negative responses at a greater than chance level, the mean Likert score on each question (and on the mean motivation score) for the 167 students was calculated and compared to a hypothesized mean of 3 (representing a neutral score) using two-tailed t-tests. The significance level was set at $\alpha < .05$ for this and all other statistical tests. In this case

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- 1 This group actually involved students from two different sections of the same course taught by the same teacher.
 - 2 MOOs are text-based virtual communities of the Internet for real-time (synchronous) communication and role playing by people in different parts of the world. The acronym stands for Multi-user domain, Object Oriented.
 - 3 The questions were developed based on a prior open-ended discussion with a smaller group of ESL students regarding what they found motivating and demotivating about working with computers.
 - 4 The original wording of reverse coded questions is included in the survey in the appendix. Elsewhere in this paper, reverse coded questions are reported in reversed form.

though, to compensate for the effects of running 30 separate t-tests, p was multiplied by 30, thus in fact requiring $p < .0017$.

Next, in order to determine how the questions grouped together into categories a factor analysis was conducted. A principal components analysis (Statview 4.0) was used to extract factors. The number of factors to be extracted was based on a root curve method (Statview 4.0) which stops selecting factors when there is a sharp shift downward in eigenvalue. After an oblique rotation, individual items which loaded at a weight of .45 or greater were considered in determining the nature of each factor.

Then, in order to determine the effects of personal background on student attitude, correlations were examined between the 30 questions (and the mean motivation score) and each of the following: self-rated typing ability, self-rated computer knowledge, years owning a computer, experience with word processing, and experience with e-mail.⁵ To see the cumulative effect of these variables, a stepwise multiple regression was carried out with these same categories as the independent variables and with the mean motivation score as the dependent variable.

To further explore the differences based on background and class, multivariate analyses of variance (MANOVA) were run with the 30 questions as dependent variables and with the following independent variables: gender, whether or not the person had a computer at home, ESL or EFL status, teacher, and class. In addition, analyses of variance (ANOVA) were run between these same variables and the mean motivation score. Finally, a two-factor ANOVA was also run with the independent variables of (1) gender and (2) computer at home as to see how these two factors might combine.

Results

RQ1: What aspects of using a computer for writing and communication do second/foreign language students find motivating?

The mean motivation score for all students on all questions was 3.617, significantly higher than a hypothetical neutral score. In addition, mean scores on 29 of the 30 questions were higher than neutral, 23 significantly so (see appendix for a complete listing). Only on the question 10 did the students indicate a slightly (though not significantly) lower than neutral attitude toward use of computers; they tended to prefer communicating with their teachers in person than by e-mail.⁶

Among the individual questions, the most positive responses, at a mean of 4.437 and significantly higher than all other questions, were given to question 24, "Learning how to use computers is important for my career". Next highest were questions 4, 6, 12, 15, 30 and 8 (see table 1).

5 Students also had been asked about their experience using the World Wide Web and MOOs, but since the majority of students had little or no experience in these areas, these aspects were not investigated further.

6 This in itself does not necessarily prove a positive attitude, since it could be the case that students would tend to answer positively on any questions put before them. It does however coincide with much anecdotal evidence that students find working with computers motivating.

Table 1: Questions with the highest mean scores

Survey Question	Mean
Learning how to use computers is important for my career.	4.437
I enjoy seeing the things I write printed out.	3.994
I enjoy using the computer to communicate with people around the world.	3.982
An advantage of e-mail is you can contact people any time you want.	3.976
Using e-mail and the Internet is a good way to learn more about different people and cultures.	3.976
Computers help people overcome weakness and powerlessness.	3.939
I am less afraid to contact people by e-mail than in person.	3.928

A factor analysis was carried out to see how the 30 questions grouped together. Three factors were extracted which were subsequently evaluated and labeled as *communication* (eigenvalue 6.186), *empowerment* (eigenvalue 2.319), and *learning* (eigenvalue 1.845) (see table 2).

Table 2: Factors and their components**I. Communication**

Included Items	Loadings
Using e-mail and the Internet makes me feel part of a community.	.763
I enjoy using e-mail to communicate with my teacher.	.696
I enjoy using the computer to communicate with my classmates.	.688
Writing to others by e-mail helps me develop my thoughts and ideas.	.648
Using e-mail and the Internet is a good way to learn more about different people and cultures.	.617
E-mail helps people learn from each other.	.582
Communicating by e-mail is a good way to improve my English.	.530
Learning to use a computer gives me a feeling of accomplishment.	.527
I enjoy using the computer to communicate with people around the world.	.480

II. Empowerment

Included Items	Loadings
Computers help people overcome weakness and powerlessness.	.593
Computers are not usually frustrating to work with.	.578
Computers help people overcome isolation.	.513
I am less afraid to contact people by e-mail than in person.	.460

III. Learning

Included Items	Loadings
Using a computer gives me more control over my learning.	.625
I can learn English faster when I use a computer.	.621
I enjoy writing my papers on computer more than by hand.	.605
I can write better essays when I use a computer.	.601
Writing by computer makes me more creative.	.579
I can learn English more independently when I use a computer.	.570
Using a computer gives me more chances to practice English.	.494

RQ2: What differences exist among these motivating aspects for students of different background?

First, correlations were examined between self-rated typing ability, self-rated computer knowledge, years owning a computer, experience with word processing, and experience with e-mail and the individual survey questions. Only experience with e-mail was found to be correlated at a level higher than .30 with any individual questions.⁷ Self-reported experience with e-mail correlated significantly with question 6 (I enjoy using the computer to communicate with people around the world, .359 correlation), question 11 (E-mail helps people learn from each other, correlations .306) and question 13 (Writing to others by e-mail helps me develop my thoughts and ideas., correlation .360)

In evaluating the relationship between the personal aspects and mean motivation, two factors were shown to correlated with mean motivation at a statistically significant level: self-rated computer knowledge, and experience with e-mail (see table 3). A multiple regression showed that the two factors together contributed for 14% of the variance.

Table 3: Personal aspects correlated with motivation scores

Personal Aspect	Correlation with Mean Motivation
Computer knowledge	.274*
Experience with e-mail	.252*
Experience with word processing	.161
Typing ability	.129
Length of time having a computer at home	-.019

* significant at $p < .05$

Multivariate analyses of variance (MANOVA) between gender and the 30 motivational questions, and between having (or not having) a computer at home and the 30 motivational questions, showed no

⁷ Due to the large number of subjects, numerous other statistically significant correlations were found between personal characteristics and individual questions. However, as explained by Hatch and Lazarton (, 1990. p. 441–442), correlations which are statistically significant still might not be of much import if they account for very little variance. In this study, correlations between personal aspects and individual questions at below the .30 level (thus accounting for less than 9% of the variance) are not discussed.

significant relationships. The analyses of variance (ANOVA) between these aspects and the mean motivational score also showed no significant relationships, whether treated separately or combined (see table 4).

Table 4: Mean motivation score by gender and access to home computer

Group	Number*	Percent	Motivation
Females			
With computer at home	49	57%	3.627
Without computer at home	37	43%	3.659
Total females	85	100%	3.641
Males			
With computer at home	44	67%	3.598
Without computer at home	22	33%	3.529
Total males	66	100%	3.575

* 15 students not included due to failure to answer one or more questions

RQ3: Is student motivation consistent among different classes and with different teachers, or does it vary according to teacher or class activity?

All groups of students, whether divided by class, by teacher, or by ESL / EFL, indicated positive attitudes toward learning with computers as indicated by their mean motivation scores (see table 5). At the same time, differences based on each of these factors were found to be significant ($p < .05$)

Table 5: Motivation scores by class

Course	Teacher	Mean Motivation
ESL		
ESL Writing	A	3.698
Academic Writing Skills	B	3.717
Academic Research Writing	B	3.841
Advanced Grammar and Composition	C	3.703
Advanced Grammar and Composition	C	3.733
Total ESL		3.731
EFL		
Technical Communications	D	3.639
Technical Communications	D	3.856
Technical Communications	E	3.474
Technical Communications	E	3.538
Thinking through Writing	E	3.249
Composition and Oral Communication	F	3.438
Composition and Oral Communication	G	3.720
Total EFL		3.550

Discussion

General Attitude toward Using Computers

The results of the survey support a position that students have a positive attitude toward using computers. One could argue that the higher-than-neutral scores are meaningless, since students might tend to answer positively on any survey. Yet this argument is undermined by that fact that even on seven of the eight questions that were reverse coded (and thus requiring a negative response to indicate a positive attitude), students indicated a positive attitude toward using computers.

It could also be argued that students gave the answers they believed were expected of them. However, efforts were made to minimize this possibility through the anonymity of the survey and the inclusion of the reverse-coded questions.

Motivating Factors

The three factors found in this survey go beyond the view of language learning motivation as being either integrative or instrumental. The strongest factor in this survey, communication, could be seen as related to integrative motivation since it involves in part students wanting to communicate with native speakers in other countries. But it also involves students wanting to communicate with other non-native speakers in other parts of the world, as well as with their classmates and their teacher. The benefits of this communication are seen as many: feeling part of a community, developing thoughts and ideas, learning about different people and cultures, and students' learning from each other.

The second factor, empowerment, also defies a traditional instrumental or integrative classification. It revolves around more affective variables, involving issues such as enhancing personal power, overcoming isolation, and making it less threatening to contact people.

The third factor indicates that students think that computers can help them learn better and more independently. Using computers, they feel can learn faster, become more creative, and write better essays. They feel they have more control of their learning and more opportunities to practice English.

Since the most positively-answered item in the survey ("Learning how to use computers is important for my career") was not included in any of these factors, an additional factor analysis was run extracting four factors instead of three. The fourth factor (eigenvalue 1.654) included this career question (at a loading of .730) as well as items such as "I enjoy the challenge of using computers" (loading at .479) and "I want to continue using a computer in my English classes" (loading at .459). Thus a case could be made that there exists a fourth factor, *achievement*, which includes both the perceived instrumental benefits as well as the intrinsic satisfaction of accomplishment.

Differences Among Students

Most noteworthy in this study were not the differences among students, but rather the similarities. All categories of students showed positive attitudes toward using computers, generally within a very narrow range. Perhaps this can be explained in part by the individualized aspects of using computer-mediated communication. By allowing students to communicate with whom they want, when

they want, and about whatever topic they want, computers may offer something for everyone (for an interesting discussion of this issue as it relates to gender, see Tella, 1992).⁸

The two individual factors which did seem most important in this study were knowledge of computers and experience using e-mail. These factors were determined based on students' self-rating, and this cannot be totally relied upon. And, even if true, we are left with the "chicken and egg" question: Does more knowledge and experience cause a more positive attitude, or does a more positive attitude cause one to gain more knowledge and experience? A common sense answer to be verified by further study, would be that the causality is bi-directional. If so, this would emphasize the importance of teachers providing time and training so that students learn as much as possible about the functions of the computer, and also creating opportunities for students to have positive experiences with e-mail communications with their classmates and others (for a discussion of these issues, see Warschauer, et al., 1994).

Differences Among Classes and Teachers

All groups of students, whether categorized by class, teacher, or ESL/EFL, showed a positive attitude toward learning with computers. Yet there were significant differences among the classes. In order to explore possible reasons for these differences, the teachers were all asked about the specific ways they used computers in the class. These discussions revealed that the class that had the lowest mean motivation score (3.249, significantly lower than 10 of the other 11 classes) was the class whose computer work was most peripheral to the goals and structure of the course; the students were encouraged to take volunteer computer workshops, and all of them had individual experience using e-mail and word processing, yet computer work was not mandatory for completion of class assignments.

In contrast, the two courses with the highest mean motivation scores (3.856 and 3.841) were classes where computer work was absolutely integral to the class. In one, the class was built around a series of e-mail dialogue journals, where the students carried out collective debate, discussion, and decision-making. In the other, the course was developed around a student newsletter that the class collectively published on the World Wide Web. (For descriptions of both of these projects, see articles by Janda and Jor in Warschauer, 1995b). This seems to support arguments made elsewhere (e.g., Warschauer, 1995a, p. 95) that the best results are achieved when on-line activities are well integrated into the ongoing structure of student assignments and interaction rather than included as an informal add-on.

Evidence also suggests that these differences were caused by classroom activity, and not just by teacher personality. In the above-mentioned case when students scored a (relatively) low mean motivation score, the same teacher had two other classes that engaged in more integral computer work and registered higher mean motivation.

Finally, it is interesting to note that ESL students scored slightly (3.73 vs. 3.55) but significantly higher than EFL students on mean motivation score. This could well have been influenced by the particular activities that were carried out in these specific classes. Nevertheless, it does suggest that the motivating aspects of computer-assisted language learning and computer-mediated communication are not necessarily limited just because students are in an environment where they have many other daily opportunities for interacting in English.

8 One important gender-related issue is unequal access to computers at home. As seen in table 4, this study confirms Tella's findings (1992) that more males than females have access to computers at home. Providing computer access and training at school can thus help overcome this inequality.

Conclusion

A study of this sort is greatly influenced by the particular choice of classes to survey and questions to ask. Any conclusions are thus tentative pending confirmation from further research. Nevertheless, this study does lend support to the following propositions:

1. A wide range of language students—whether they are male or female, skilled or unskilled at typing and using computers, and experienced or inexperienced in using computers—have a positive attitude toward using computers for writing and communication in the language classroom. This holds true in both second and foreign language classes.
2. Factors which influence students positive attitude toward computers include the benefits of computer-mediated communication, the feeling of personal empowerment, and the enhancement of learning opportunities. Another possible factor is the achievement (and sense of achievement) which learning to use computers can help bring about.
3. Teachers can enhance student motivation by helping students gain knowledge and skill about using computers, giving them ample opportunity to use electronic communication, and carefully integrating computer activities into the regular structure and goals of the course.

References

- Armour-Thomas, E., White, M. A., & Boehm, A. (1987, April). *The motivational effects of types of computer feedback on children's learning and retention of relational concepts*. Paper presented at the Annual Meeting of the American Educational Research Association.
- Au, S. Y. (1988). A critical appraisal of Gardner social-psychological theory of second-language (L2) learning. *Language Learning, 38*, 75–100.
- Barson, J., Frommer, J., & Schwartz, M. (1993). Foreign language learning using e-mail in a task-oriented Perspective: Interuniversity experiments in communication and collaboration. *Journal of Science Education and Technology, 4*, 565–584.
- Batson, T. (1988). The ENFI project: A networked classroom approach to writing instruction. *Academic Computing, 2*(5), 32–33.
- Beauvois, M. H. (1992). Computer-assisted classroom discussion in the foreign language classroom: Conversation in slow motion. *Foreign Language Annals, 25*, 455–464.
- Brown, J. (1986). Some motivational issues in computer-based instruction. *Educational Technology, 26*(4), 27–29.
- Chapelle, C., & Jamieson, J. (1986). Computer-assisted language learning as a predictor of success in acquiring English as a Second Language. *TESOL Quarterly, 20*, 27–46.
- Chun, D. (1994). Using computer networking to facilitate the acquisition of interactive competence. *System, 22*, 17–31.
- Crookes, G., & Schmidt, R. (1991). Motivation: Reopening the Research Agenda. *Language Learning, 4*, 469–512.
- Cummins, S., & Sayers, D. (1990). Education 2001: Learning networks and educational reform. *Computers in the Schools, 7*, 1–29.
- DiMatteo, A. (1990). Under erasure: A theory for interactive writing in real time. *Computers and Composition, 7*(S.I.), 71–84.

- Dornyei, Z. (1994). Motivation and motivating in the foreign language classroom. *Modern Language Journal*, 78, 273–284.
- Faigley, L. (1990). Subverting the electronic workbook: Teaching writing using networked computers. In D. Baker & M. Monenberg (Eds.), *The writing teacher as researcher: Essays in the theory and practice of class-based research*. Portsmouth, NH: Heinemann.
- Fox, M. (1988). *A report on studies of motivation teaching and small group interaction with special reference to computers and to the teaching and learning of arithmetic*. Milton Keynes, U.K.: The Open University, Institute of Educational Technology.
- Gardner, R. C., & Tremblay, P. F. (1994a). On motivation, research agendas, and theoretical frameworks. *Modern Language Journal*, 78, 359–368.
- Gardner, R. C., & Tremblay, P. F. (1994b). On motivation: Measurements and conceptual considerations. *Modern Language Journal*, 78, 524–527.
- Hatch, E., & Lazaaron, A. (1990). *The research manual: Design statistics for applied linguistics*. Boston, MA: Heinle & Heinle.
- Hawisher, G., & LeBland, P. (1992). *Re-imagining computers and composition: Teaching and research in the virtual age*. Portsmouth, N.H.: Heinemann.
- Hicken, S., Sullivan, H., & Klein, J. (1992). Learner control modes and incentive variations in computer-delivered instruction. *Educational Technology Research and Development*, 40(4), 15–26.
- Kelm, O. (1992). The use of synchronous computer networks in second language instruction: A Preliminary Report. *Foreign Language Annals*, 25, 441–454.
- Kern, R. (1993, November). *Restructuring classroom interaction with networked computers: Effects on quantity and characteristics of language production*. Paper presented at the meeting of American Council of Teachers of a Foreign Language, San Antonio, Texas.
- Kinzie, M., Sullivan, H., & Berdel, R. (1988). Learner control and achievement in science computer-assisted instruction. *Journal of Educational Psychology*, 80, 299–303.
- Kroonenberg, N. (1994/1995). Developing communicative and thinking skills via electronic mail. *TESOL Journal*, 4(2) 24–27.
- Mosley, M. L. (1984, January). *Computer-assisted instruction and continuing motivation*. Paper presented at the Annual Meeting of the Association for Educational Communications and Technology, Dallas, Texas.
- Oxford, R. (1994). Where are we regarding language learning motivation? *Modern Language Journal*, 78, 512–527.
- Oxford, R., & Shearin, J. (1994). Language learning motivation: Expanding the theoretical framework. *Modern Language Journal*, 78, 12–28.
- Paramskas, D. (1993). Computer-assisted language learning (CALL): Increasingly into an ever more electronic world. *The Canadian Modern Language Review*, 50, 124–143.
- Perez, E. C., & White, M. A. (1985). Student evaluation of motivational and learning attributes of microcomputer software. *Journal of Computer-Based Instruction*, 12(2), 39–43.
- Peterson, N., & Sellers, D. (1992, October). *Student motivation and learning styles in a multimedia learning environment*. Paper presented at the Annual Meeting Northern Rocky Mountain Educational Research Association, Custer, South Dakota.
- Pollock, J., & Sullivan, H. (1990). Practice mode and learner control in computer-based instruction. *Contemporary Educational Psychology*, 15, 251–260.

- Pulvermuller, F., & Schumann, J. (1994). Neurobiological mechanisms of language acquisition. *Language Learning*, 44, 681–734.
- Relan, A. (1992, February). *Motivational strategies in computer-based instruction: Some lessons from theories and models of motivation*. In proceedings of selected research and development presentations at the Convention of the Association for Educational Communications and Technology (ERIC Document Reproduction Service No. ED 348 017) .
- Sayers, D. (1993). Distance team teaching and computer learning networks. *TESOL Journal*, 3(1), 19–23.
- Skehan, P. (1989). *Individual differences in second language learning*. London: Edward Arnold.
- Skehan, P. (1991). Individual differences in second language learning. *Studies in Second Language Acquisition*, 13, 275–298.
- Soh, B. L., & Soon, Y. P. (1991). English by e-mail: creating a global classroom via the medium of computer technology. *ELT Journal*, 45, 287–292.
- Sullivan, N. (1993). Teaching writing on a computer network. *TESOL Journal*, 3(1), 34–35.
- Susser, B. (1992). ESL/EFL process writing with computers. *CAELL*, 4(2) 16–22.
- Susser, B. (1993). Networks and project work: Alternative pedagogies for writing with computers. *Computers and Composition*, 10(3) 63–89.
- Tella, S. (1992). *Boys, girls and e-mail: A case study in Finnish senior secondary schools*. Helsinki: University of Helsinki, Department of Teacher Education.
- Vilmi, R. (1995). HUT e-mail writing project: An ongoing experiment. In T. Orr (Ed.), *English for science and technology: Profiles and perspectives* (pp. 47–59). Aizuwakamatsu, Japan: University of Aizu, Center for Language Research.
- Waldrop, P. (1984). Behavior reinforcement strategies for computer-assisted instruction: Programming for success. *Educational Technology*, 24(4), 38–41.
- Wang, Y. M. (1993). *E-mail dialogue journaling in an ESL reading and writing classroom*. Unpublished Ph.D. dissertation, University of Oregon at Eugene.
- Warschauer, M. (1995a). *E-mail for English Teaching*. Alexandria, VA: TESOL Publications.
- Warschauer, M. (Ed.). (1995b). *Virtual Connections: On-line Activities and Projects for Networking Language Learners*. Honolulu, HI: University of Hawai'i, Second Language Teaching and Curriculum Center.
- Warschauer, M., Turbee, L., & Roberts, B. (1994). *Computer Learning Networks and Student Empowerment*. (Research Note No. 10) University of Hawai'i, Second Language Teaching and Curriculum Center.
- Williams, M. (1993, January). *A comprehensive review of learner-control: The role of learner characteristics*. Paper presented at the Convention of the Association for Educational Communications and Technology Sponsored by the Research and Theory Division, New Orleans, LA. (ERIC Document Reproduction Service No. ED 362 211)
- Wu, Y.-C. (1992, November). *Computerized teachers' praise: Incorporating teachers' images and voices*. Paper presented at the annual meeting of the Mid-South Educational Research Association, Knoxville, TN. (ERIC Document Reproduction Service No. ED 354 873)

Appendix
Student Survey: Attitudes toward Using Computers*

Age _____ Sex _____ Country of birth _____.

Native language _____ Year in school _____.

Name of teacher _____ Name of course _____.

Please rate your typing ability:

poor _____ fair _____ good _____ very good _____ excellent _____.

Please rate your knowledge of computers:

poor _____ fair _____ good _____ very good _____ excellent _____.

Do you have a computer at home? yes _____ no _____ For how long _____.

How you ever used a computer to do the following things?:

Word processing: _____ a lot _____ a little _____ never _____.

E-mail: a lot _____ a little _____ never _____.

MOOs: a lot _____ a little _____ never _____.

World Wide Web: a lot _____ a little _____ never _____.

For each of the remaining questions, please write a number (1–5):

1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree

- 1) I can write better essays when I do them on computer. (3.180**)
- 2) Revising my papers is a lot easier when I write them on computer. (3.850**)
- 3) I enjoy writing my papers by hand by computer more than by hand. (3.222 when reverse coded)
- 4) I enjoy seeing the things I write printed out. (3.994**)
- 5) Writing papers by hand saves time compared to by computer. (3.102 when reverse coded)
- 6) I enjoy using the computer to communicate with people around the world. (3.982**)
- 7) I enjoy using the computer to communicate with my classmates. (3.692**)
- 8) I am more afraid to contact people by e-mail than in person. (3.928** when reverse coded)
- 9) I enjoy using the computer to communicate with my teacher. (3.548**)
- 10) If I have a question or comment, I would rather contact my teacher in person than by e-mail. (2.844 when reverse coded)
- 11) E-mail helps people learn from each other. (3.692**)
- 12) An advantage of e-mail is you can contact people any time you want. (3.976**)
- 13) Writing to others by e-mail helps me develop my thoughts and ideas. (3.617**)
- 14) Using e-mail and the Internet makes me feel part of a community. (3.976**)

- 15) Using e-mail and the Internet is a good way to learn more about different people and cultures. (3.976**)
- 16) Communicating by e-mail is a good way to improve my English. (3.784**)
- 17) Learning to use a computer gives me a feeling of accomplishment. (3.820**)
- 18) Writing by computer makes me more creative. (3.482**)
- 19) Using a computer gives me more chances to read and use authentic English. (3.581**)
- 20) I want to continue using a computer in my English classes. (3.892**)
- 21) Using a computer is not worth the time and effort. (3.731** when reverse coded)
- 22) Using a computer gives me more control over my learning. (3.343**)
- 23) I enjoy the challenge of using computers. (3.855**)
- 24) Learning how to use computers is important for my career. (4.437**)
- 25) I can learn English more independently when I use a computer. (3.446**)
- 26) Computers keep people isolated from each other. (3.273 when reverse coded)
- 27) I can learn English faster when I use a computer. (3.049)
- 28) Using a computer gives me more chances to practice English. (3.648**)
- 29) Computers are usually very frustrating to work with. (3.241 when reverse coded)
- 30) Computers makes people weak and powerless. (3.617** when reverse coded)

overall mean score for all students, all 30 questions: 3.617

* Means of responses are listed in parentheses

** Significantly better than a hypothetically neutral score of 3 at $p < .05$