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The Relationship Between Technology Support and Extent of Technology Integration Into College-Level Foreign Language Curricula

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by

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DEDICATION

I would like to dedicate this dissertation to my Angel and my Hero:

my mother and father.

Who I am and all I will accomplish in my life

is mostly due to their

sacrificial love,

tireless encouragement and support,

and abiding hope for my very best.

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Many friends, colleagues, and professors have encouraged me throughout the process of completing this dissertation, and for their friendship I am deeply thankful..

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ABSTRACT

Although computer use has become widespread throughout foreign language (FL) education, availability of computers alone is not sufficient for increasing their use. Integration requires rich and varied technology support, which includes instructional as well as technical support. To date, in the field of adult FL learning no quantitative examination of the relationship between the different aspects of technology support and computer integration into the curricula has been attempted.

This study explores the direction and strength of the relationships among the different types of technology support and the integration of computers into the curricula of college and university FL programs. The investigation was conducted by means of an online survey instrument developed and pilot tested by the researcher and disseminated nationwide to teachers in U.S. college and university foreign language departments. It probes the extent and nature of computer integration within FL curricula as well as the extent and nature of the technology support available. It also examines the relationships between the different types of technology support and the extent and nature of integration to determine which, if any, were the strongest.

The study found that technology support in the form of professional development that enables teachers to understand and create ways to seamlessly integrate computers into their teaching is needed more than any other type of technology support, including the provision of new, updated, stat-of-the art computers. The findings provide a broader understanding of technology support and its role in increased technology integration among college-level foreign language teachers. Further, the findings potentially provide guidelines for FL program directors as to the areas of technology support in which their expenditure of resources will best benefit their institute.

CHAPTER I:

INTRODUCTION

The chairperson of the Foreign Language Studies department at a major university plans to upgrade the department's computer lab. First installed in the early 1990s, the computer lab has been popular with students for typing papers, browsing the Web, and checking e-mail; however, the instructors in the department rarely use it in their teaching for more than an occasional workbook or drill-and-practice activity. All parties concerned are convinced that an upgrade of the lab will enable the teachers to start integrating technology more fully into their instruction.

The computers are purchased, the software installed, and students return to type their papers and check their e-mail. The re-energized instructors plan to use the computers more fully once their schedules lighten up, allowing them time to experiment with the new equipment to see exactly how they can use it. Unfortunately, with already full schedules, most of the instructors never find that extra time.

This scenario is fictional, yet it may occur in one form or another more often than most administrators wish to admit. Many postsecondary schools have spent vast resources on acquiring a computing infrastructure; however, questions regarding the actual use of the computers purchased remain largely unanswered. No comprehensive examination of how computers are being used in college or university foreign language education has been attempted since 1980 (Olsen, 1980). At the K-12 level, on the other hand, many nationwide studies examining computer use have been conducted (Becker, 2000; Glennan & Melmed, 1996; Gray, Thomas, & Lewis, 2010; U.S. Congress, Office of Technology Assessment [OTA], 1995; U.S. Department of Education, National Center for Education Statistics [NCES], 2000). If higher education institutions' experience with technology use is similar to that of K-12 schools, the majority of teachers use computers for instruction infrequently, if at all.

A 1997 report by the President's Committee of Advisors on Science and Technology (Report to the President) warned that K-12 teachers' low rates of computer-usage in their teaching would lead to computer labs becoming little more than "junkyards for expensive, but unused, computer equipment" (section 6.2 Projected Cost of Educational Technology, ¶ 8). Becker (2001), reporting results from the 1998 nationwide Teaching, Learning, and Computing (TLC) survey of K-12 schools, revealed that even though there were over 10 million computers in schools nationwide, their use as instructional tools by teachers of secondary academic-subject such as English or Social Studies was occasional at best. At the secondary school level, English teachers were found to use computers the most; however, less than 25 percent of them used computers with their students at least 20 times in a typical school year (p. 4). In recent years, only 34 percent of secondary school level teachers reported using computers during classroom instructional periods "often"; however, the report did not provide an explanation as to what "often" quantitatively represents (Gray *et al.,* 2010).

Many have assumed that this dearth of use results from shortcomings in computing resources, either in the numbers of computers available or in their quality. The response has often been to purchase new, or upgrade old, hardware and software, increasing the availability of these resources and continuing to foster the unsubstantiated belief that if the technology is available and up to date, it will be used. According to Becker (2001), this has not been the case at the K-12 level where the number of computers available to teachers has grown at a phenomenal rate, yet whose use in instruction has been slow to come about. As of 2009, although 97 percent of K-12 teachers reported having one or more computers in their classroom available for use every day, only 40 percent of them report they or their students use the computers often. Further, the greatest degree of use among teachers seems to be for administrative rather than instructional purposes (Gray *et al.*, 2010) .

The continuing investment in technology stems from a confidence that the computer can dramatically improve education. In 1983, when instead of choosing a Man of the Year, *Time* magazine named the microcomputer the Machine of the Year, 68% of Americans felt that the personal computer would soon improve the quality of their children's education (Friedrich, 1983, p. 14). The IBM PC, introduced two years earlier, had energized the personal computer market, spawning a new industry that doubled sales figures of personal computers each year in 1980, 1981, and 1982. The computer was quickly moving into Americans' lives.

In 1996, a little more than a decade after *Time's* tribute, a study commissioned by the White House and the U.S. Department of Education found that schools in the U.S. had obtained large numbers of computers between 1983 and 1995. As a result, the ratio of students to computers in U.S. public schools decreased from 125 students per computer to only 9 students per computer (Glennan & Melmed, 1996, Summary section, ¶ 1). By 2009, this ratio was further reduced to only 5.3 students per computer (permanently in the classroom), and to as low as 1.7 students per computer when computers that could be brought into the classroom on an as-needed basis were included in the inventory of available computers (Gray *et al.,* 2010, p. 3).

However, computer-to-student ratios provide a poor picture of the actual impact which computers have had on education. For example, the Glennan and Melmed (1996) study found that, although the number of computers present in schools had dramatically increased between 1983 and 1995, few schools had actually endeavored to systematically employ technology throughout their entire curricula. Most uses of computing technology in teaching tended to be occasional, isolated instances implemented by a few technologically progressive teachers. Furthermore, computers in high schools, when used at all, were being used 63% of the time for vocational and general computer education and only 31% of the time in support of academic subjects. They were used for the study of foreign languages only 2.7% of the time (Use of computers by students section, ¶ 2). Thus, although computers had proliferated widely throughout most K-12 schools, they were predominantly employed to study *about* computers, rather than as tools to enhance and support academic studies. Despite the fact that schools were acquiring the technology, it appeared that not many within the institutions knew how to optimally exploit its potential in the classroom.

Over time it has become increasingly clear that simply filling schools with computers will not change educational practices. Indeed, the 1995 OTA report stated that technology "in and of itself, does not directly change teaching or learning. Rather, the critical element is how technology is incorporated into instruction" (p. 57). The Apple Classrooms of Tomorrow (ACOT) project also discovered this early on as researchers came to realize that low computer-to-student ratios had little positive impact on student learning. In addition, when teachers in the ACOT project initially used the computers, they often merely translated their traditional "text-dominated, lecture-recitation-seat work instructional approach to an electronic medium" (Sandholtz, Ringstaff, & Dwyer, 1997, p. 9).

The ACOT researchers realized that if computers were to be used significantly for learning, teachers would need to be trained in new ways to use the technology. Their solution was to train and encourage teachers to provide more project-based activities in which the computers would be used as tools and the teachers would function more as coaches or facilitators rather than information disseminators. The researchers found that, although the changes took time, those who followed their suggestions eventually discovered computers to be a powerful and indispensable tool in their teaching (Sandholtz *et al.*, 1997).

The ACOT researchers identified a series of five stages of computer integration: entry, adoption, adaptation, appropriation, and invention. They discovered that most teachers progress through these stages as they move from little or no integration of computers in their teaching to a level at which they find computers to be a seamless part of their instructional repertoire. This framework provides a useful scale for the measurement of the extent of computer integration by any particular person or program at any specific time.

Others have also purported to find a correlation between teachers' project-based or constructivist approaches to computer use in learning and the greater integration of computers into curricula. The CEO Forum's year two School Technology and Readiness (STAR) report advises that if technology is integrated optimally into the curriculum, it transforms learning so that it is "student-centered, problem and project centered, collaborative, communicative, customized and productive" (1999, p. 5). In addition, Becker's (2001) analysis of the TLC survey data revealed that teachers who used computers the most with their students were the most constructivist in their teaching. They were twice as likely to have their students use computers at least once a week in class than were teachers who were oriented toward a more traditional, information-transmission approach. Thus, research from K-12 education indicates that if computers are to be used to their greatest advantage in education, the task will require more than the addition of machines loaded with software; it will require changes in the ways teachers teach and conduct their classrooms.

One of the greatest challenges to increased use and integration of computing technologies is the provision of the kind of support needed to accomplish such significant changes. Glennan and Melmed (1996) discovered that what little professional development was usually available to teachers was sorely inadequate, often consisting of a one-time seminar or a class with 200 teachers and one expert to address all of their needs. Instead of this, Glennan and Melmed suggested that teachers need (1) ongoing, adequate time for planning and skill-building with the technology, (2) ongoing, individualized training, preferably contextualized so that teachers can relate what they learn to their teaching, and (3) professional development opportunities that are consistent with the school's overall educational goals. Providing for these needs will help teachers learn not just how to use the technology, but how to "develop and manage the types of learning environments that are facilitated by these technologies" (1996, chapter 4, Opportunities for Federal, State, and Local Action section, ¶ 1).

Technology support of this type will require an administrative commitment greater than what is often available. Typically, schools overspend on their initial acquisition of hardware, leaving inadequate funds for later upgrades and replacements, software, maintenance, technical support personnel, and professional development (Report to the President, 1997). For example, although the report recommends that if computers are to be used advantageously by teachers, 30% or more of the budget for computing technology should be designated for professional development, most schools typically spend only an average of 15% of their computing budget for staff training (Report to the President, 1997, section 6.2 Projected cost). The disproportionately large amounts spent on the computing infrastructure (hardware, networking, Internet access) often result in teachers feeling unprepared, unable, and unwilling to use computers in their teaching.

The trend of focusing most of an institution's resources on the computing infrastructure while neglecting the need for technology support appears to have a deleterious effect on the integration of computers into teaching. Researchers have identified support (technical and pedagogical) as a critical factor related to the extent and type of K-12 teachers' integration of computers into their curricula (Becker, 2000; NCES, 2000; Ronnkvist, Dexter, & Anderson, 2000). In fact, there is indication that technology support is as important to the use and integration of computers as is the availability of an adequate computing infrastructure consisting of up-to-date hardware, software, and Internet connectivity (Kramer, Walker, & Brill, 2007; NCES, 2000; OTA, 1995; Report to the President, 1997). Although support in the form of professional development workshops and training has increased over the past few years, the types of support tend to be remain technical rather than pedagogical in nature. The 2005 CDW-G *Teachers Talk Tech* report found that only 28.2 percent of teachers surveyed felt they had been well-trained in how to integrate technology into their teaching. In contrast, the greatest availability of professional development was in the administrative use of the computer with the majority of teachers indicating their professional development opportunities had trained them well for the use of e-mail (50.2%), word processing software (47.9%), and the Internet (41.9%) (CDW-G, 2005).

Technology support involves much more than typical "technical" support. Using data from the Teaching, Learning, and Computing (TLC) survey, Ronnkvist *et al.* (2000) provide a technology support framework that includes not only the provision and support of the computing infrastructure (technical support), but also a consideration of the type of support staff, the availability of personal help and guidance for teachers, opportunities for professional development, and the provision of professional incentives for computer use. Although they argue that technology support in all of these areas is needed if computing technologies are to be utilized to their fullest extent, each of these different aspects of support has varying degrees of influence on the type and extent of technology integration.

In addition to identifying these five areas of support, Ronnkvist and his colleagues found that the professional development provided to teachers needs to be both technical and subject-matter specific, with a focus on integrative or instructional use of the technology as well. They especially emphasize the positive relationship found between instructional support (as opposed to technical support) and teachers' greater use of technology, indicating that schools with teachers who integrate technology into their teaching and professional practice to the greatest degree have professional technology coordinators who are prepared to provide teachers not only with high-quality technical support with the hardware and software, but also with specific, one-on-one assistance in the instructional uses of technology (2000). Hence, if computers are to be used to their fullest advantage, technology support must move beyond the provision of up-to-date computers and software and the occasional one-shot workshop.

In the field of adult foreign language education, the role of computing technologies has evolved over the past 30 years in a vein similar to that in general education. In the early years of computer assisted language learning (CALL), computers were at the center of attention, functioning in the role of surrogate teachers. Typically, they were used to provide tutorials or drill-and-practice exercises, either as stand-alone instructional systems or as instruction adjunct to the classroom (Ahmad, Corbett, Rogers, and Sussex, 1985; Olsen, 1980). In the last three decades, however, calls for the computer to be used as a tool providing interactive activities has moved the learner to the center of attention, and the computer has moved from playing the role of instructor to that of facilitator (Johnson, 1985; Underwood, 1984). With the growth and popularity of the Internet, researchers have come to increasingly emphasize the use of networked computers as communication tools to provide authentic communities of learners in which users interact with one another in online language-learning activities (Warschauer, 2000).

While studies of computer use in adult foreign language education have provided some descriptive data regarding the computing infrastructure and teachers' and students' attitudes toward its use, little attention has been given to the types of technology support that are needed for a greater degree of integration and use in adult FL learning (Craven & Sinyor, 1987, 1998; Levy, 1997; Olsen, 1980). In K-12 education, technology support, including aspects of technical and instructional support, has been identified as a key element in the process of integrating computers into teachers' practices (Kramer *et al.,* 2007; NCES, 2000; OTA, 1995; Report to the President, 1997; Ronnkvist *et al.*, 2000). Whether or not these same levels and types of technology support believed to be conducive to greater computer integration in general education are equally important in adult FL education has not been investigated and forms the basis for the study herein.

Statement of the Problem

Although computers have become widespread throughout K-12 education, a number of studies have stressed that the availability of computers alone is not sufficient for increasing their use. These studies argue that unless the computers are integrated into project-based, constructivist learning, their use will remain infrequent. Furthermore, such integration will require rich and varied technology support which includes instructional as well as technical support (Glennan & Melmed, 1996; Kramer *et al.,* 2007; NCES, 2000; OTA, 1995; Report to the President, 1997; Ronnkvist *et al.*, 2000; Sandholtz *et al.,* 1997).

Such observations and warnings apply equally to the realm of FL teaching. Garrett (1996) contends that within the field of adult FL education, the full impact of computers on language learning has yet to be realized because the technology is still primarily used either as a medium to deliver traditional content that heretofore had been delivered in other ways or as a means to provide greater time-on-task. She argues that greater integration will affect not only the teacher-student relationship, but also the very nature of language learning; however, she also recognizes that most FL teachers are reluctant or unsure of how to embrace such changes. More recently, she has clarified this view of integration by pointing out that even though most FL teachers today use computers for tasks such as e-mail, word processing, or even finding authentic materials for their class on the Internet, these uses of technology are not CALL. She explains that true CALL “designates a dynamic complex in which technology, theory, and pedagogy are inseparably interwoven” (Garrett, 2009, p. 720).

Fortunately, exciting possibilities for promoting technology integration and improved FL learning have become more available and easier to apply with today’s technology. It provides unprecedented opportunities for linguistic interchange for language acquisition. Moreover, the advantages of integrated technology use are compatible with findings in SLA (Second Language Acquisition) research which indicate the need for authentic, interactive communication (Chapelle, 2009; Ellis, 1999; Garrett, 1996; Gass, 1997; Long, 1983; Pica, 1987, 1991).

Although it has become increasingly clear in K-12 education that a high degree of computer integration requires high-quality technology support (Blomeyer, 1991; OTA, 1995; Report to the President, 1997; Ronnkvist *et al*., 2000), it remains to be seen whether the same degree and types of technology support will be as important to computer integration in adult FL education. The K-12 school context differs from that of colleges and universities. The availability of resources is different for both as well; thus, the results found from studies of K-12 computer integration cannot be generalized to computer integration in college and university FL education.

To date, in the field of adult FL learning no quantitative examination of the relationship between the different aspects of technology support and computer integration into the curricula has been attempted. This lack of attention may be due to a paucity of funds or possibly to an absence of awareness that technology support in its many forms is needed by instructors in higher education. Perhaps it is presumed that teachers have already received the preparation they require to implement the types of pedagogical changes that will result in fuller computer integration. Whatever the reason, there remains a need to first determine the extent to which computer integration occurs in the curricula of adult FL programs and then to investigate which types of technology support are most strongly related to higher degrees of integration. Knowing which aspects of technology support most closely relate to computer integration in adult FL education will promote a more effective use of available resources.

Purpose of the Study

This study explores the direction and strength of the relationships among the different types of technology support and the integration of computers into the curricula of college and university foreign language programs. For the purposes of this study, integration is measured according to a scale based on that developed by the ACOT project (Sandholtz *et al.,* 1997), and the types of technology support are measured according to the framework provided by Ronnkvist *et al.,* (2000). A survey instrument was developed and pilot tested with a small group of teachers. Following revision, it was disseminated nationwide to teachers at U.S. college and university foreign language departments. It probed the extent and nature of computer integration within FL curricula, as well as the extent and nature of the technology support available. It also examined the relationships between the different types of technology support and the extent and nature of integration to determine which, if any, are the strongest.

Research Questions

The main research question for this study is: What is the relationship between the amount and type of technology support provided to FL teachers and the degree to which FL teachers integrate computers into the curricula of adult FL programs? The investigation addressed the following questions:

1. What is the relationship between the availability of computers and the extent to which computers are integrated into the curricula?
2. What is the relationship between the characteristics of the technology support staff and the extent to which computers are integrated into the curricula?
3. What is the relationship between the frequency and types of professional development opportunities and the extent of integration?
4. What is the relationship between the availability of one-on-one guidance and the extent of integration?
5. What is the relationship between the provision of professional incentives and the extent of integration?
6. What are the interrelationships between the above-referenced aspects of technology support and the degree of computer integration?
7. For what types of activities do foreign language instructors use computing technologies the most in their instruction?
8. How do instructors' attitudes and beliefs about the use of computing technologies in their instruction correlate with their actual usage?

Definitions

Computer Assisted Instruction (CAI) – Term generally used when referring to the role of the computer as a tutor to deliver tutorial or drill-and-practice applications.

Computer Assisted Language Learning (CALL) – Term originally limited to the use of the computer as an instructional device but used by Levy (1997) to cover all roles of the computer in language learning.

Computer Mediated Communication (CMC) – communication over the Internet using the computer as medium. It may be synchronous (both parties in real-time communication) or asynchronous (delayed communication).

Extent of Integration – Framework suggested by Sandholtz *et al.* (1997) that includes five stages: entry, adoption, adaptation, appropriation, and invention.

First Language – the language one acquires prior to any other languages, usually acquired as an infant.

Foreign Language Learning – The condition in which learners study a target language (TL), a language other than their native language, in an environment in which the TL is not spoken as the first language of the general population. For example, native English-speaking students who are studying German in the United States would be learning German as a foreign language.

L1 – an abbreviation used to refer to one's first, or native, language.

L2 – an abbreviation used to refer to a second language acquired after the acquisition of one's first language

Second Language Acquisition – The learning or acquisition of second (or additional) languages in addition to one's native tongue.

Second Language Learning – The condition in which learners study a TL in an environment in which the TL is spoken as the first language of the general population. For example, non-native English speakers studying English in the U.S. would be studying English as a second language.

Target Language – the language other than one's native language that is being acquired.

CHAPTER II:

REVIEW OF THE LITERATURE

In order to provide an understanding of the context in which this study is situated, this section will first provide an overview of the literature addressing ways in which computers have been and are being used in second and foreign language learning. Next, in light of the vast resources invested in educational technology, studies that report on the question of efficacy of computer use will be considered. This will be followed by a review of studies examining what computer integration entails, the varied facets of technology support, and a consideration of the importance of computer integration into adult FL learning in light of current trends in SLA theory.

The Nature of Computer Use in Language Learning

During the 1960s and 1970s, computer use was primarily dependent on the use of computer terminals that were either connected directly or by dedicated phone line to expensive mainframe computers. Users, who were usually at or very near institutions at which mainframes were located, would pay for time on the system. As a result, the computer was costly to use and of limited availability, so most teachers rarely, if ever, had a chance to use these systems (Chapelle, 2001; Underwood, 1984).

Representative of the way in which computers were used during these decades was the PLATO project (Programmed Logic for Automated Teaching Operations) at the University of Illinois at Urbana-Champaign. PLATO was used to teach a number of subjects, including foreign languages, and many see it as the archetypal CALL program

(Ahmad *et al.*, 1985; Chapelle, 2001; Levy, 1997). Although the PLATO system was ahead of its time in its ability to produce graphics and text, display non-Roman fonts, utilize audio, and even provide a type of e-mail, its use in language learning remained "practical" (Ahmad *et al.*, *1985*; Levy, 1997), namely to present mechanical vocabulary and grammar drill-and-practice exercises or computer-based tests, thereby freeing classroom time for more expressive and interactive activities (Ahmad *et al*., 1985; Levy, 1997; Underwood, 1984). Other examples of the early use of CALL mainframe computer systems include Dartmouth University's CARLOS (Computer Assisted Review Lessons On Syntax) system, which provided homework exercises (Ahmad *et al*., 1985; Underwood, 1984), a self-instructional system at Stanford University that presented most of the material for an entire Russian course on the computer (Ahmad *et al*., 1985), and a system developed by IBM for teaching German at the State University of New York at Stony Brook (Underwood, 1984). The latter system consisted of Audiolingual drills, practice exercises that focused on the formation of language habits, and even material derived from the Grammar-Translation Method, an approach which saw the translation of texts as the primary means of foreign language learning (Sanders, 1995; Underwood, 1984). Finally, the TICCIT (Time-shared Interactive Computer-Controlled Information Television) program at the University of Texas at Austin and Brigham Young University was a first-of-its-kind in that it allowed students to select the path by which they progressed through the lessons (Jones, 1995).

Even though vast resources were invested into the development of these programs, they were not widely used among adult FL educators. As a result of a 1978-1979 survey of 1,810 foreign language departments at four-year colleges throughout the

United States, Solveig Olsen (1980) reported that a great majority of foreign language educators felt that CALL was ineffectual and a waste of time and money (p. 342). Out of the 602 responses she received (a 33% response rate), only 62 participants (10.3%) indicated they were using CALL (p. 342). An additional 14 participants (2.3%) indicated that they planned to begin using CALL within the next two years (p. 342). Surprisingly, 526 participants (87.4%) revealed that they did not make use of CALL nor did they anticipate doing so in the near future (p. 342).

According to Olsen (1980), the most common reason given for not using CALL was the cost. Participants mentioned that hardware was too expensive, software was also expensive to purchase and time-consuming to develop, and that there was a lack of experienced support personnel in their institutions. There were also beliefs expressed that computers were ineffective as instructional tools, that existing computing facilities had insufficient capacity, and that computers would de-humanize language learning. Finally, there was a fear expressed that computers would replace teachers in the classroom, costing people their jobs.

Among the positive remarks from those who were actually using CALL, Olsen (1980) found that French, Spanish, and German were the languages most often listed as being taught. Latin was fourth, followed by Russian, Greek, and Italian. Other languages being taught through CALL at the time were Arabic, Chinese, Danish, Dutch, Hebrew, Japanese, Portuguese, Swahili, and Swedish – 16 languages in all.

Olsen (1980) further found that CALL was used most often in basic language courses, and that there was less than a 50% continuation of CALL at second-year levels (p. 344). Advanced level programs were restricted to a few specialized courses;

however, Latin took advantage of CALL for a broader range of courses at all levels. The majority of programs used were for vocabulary and grammar, and most departments used CALL as a supplement to traditional courses.

Almost all of Olsen's (1980) participants who used CALL reported some positive results, predominantly in student attitudes and motivation to study further when using computers. She also found that users claimed that the computer enabled students to learn more in a shorter time than is usual in regular courses. However, Salaberry (2001) pointed out that there was little or no empirical evidence to support the latter claim at the time Olsen conducted her survey.

Olsen (1980) discovered that problems encountered by those using CALL included (a) the cost of time-sharing systems, (b) the limited availability of computer terminals, (c) a lack of support from colleagues, (d) the demands on the developer's time, and (e) the cost of terminals to display non-Western alphabets. The overall negative impression expressed by the participants to Olsen's survey reflects the realities of time-shared computer use in 1978 and 1979, i.e. before the widespread availability of the microcomputer. CALL was an expensive endeavor, and the computer was used as an adjunct to or substitute for the teacher, spawning many fears that computers would replace teachers.

Funding was an additional problem for CALL in these early years. Olsen (1980) found that many administrators were reluctant to spend large sums on equipment and services whose benefit to learning was as yet not established. Hart (1995) also points out that funding for CALL was drying up in the 1970s. Because access to and use of mainframe computers required researchers to charge their expensive time to a university account, they were unable to adequately develop programs on their own before seeking funding. In addition, when those who controlled the funding were approached with a language-learning project, they would often either respond that it was a good idea, but impossible to implement, or they would argue that funding was available but that implementation was unjustified.

The situation changed during the 1980s when the personal computer, or microcomputer, rapidly gained in popularity. These less expensive stand-alone units were more accessible than mainframes, allowing many teachers to own them and even develop their own dedicated CALL software. However, Ahmad *et al.* (1985) claim that the CALL software produced during this time did little to advance the standards of CALL. This is because most developers did little more than adapt the drill-and-practice methodology from earlier time-sharing systems such as PLATO for use on the personal computer. Consequently, Ahmad and his colleagues assert that the greatest impact of microcomputers prior to 1985 was primarily to increase the number of people with access to a computer.

This growth in the use of CALL is demonstrated in the results of a survey conducted seven years after Olsen (1980) published her results. Although the survey was carried out in Canada, it should be reflective of the progress CALL was making in the United States as well. Conducted in 1985 and 1986, Craven and Sinyor (1987) sought to determine the degree to which computers were used in Canadian universities for second language teaching, the kinds of computer equipment being used, and the overall satisfaction teachers and students felt with CALL.

Craven and Sinyor (1987) sent surveys to 173 university language departments and language labs in Canada and received 139 (80%) responses. Of the 139 respondents, 46 (33%) were using computers in their teaching (p. 508). An additional 45% were interested in using computers in the future, while 9% responded that they were possible users in the future (p. 508). Only 10% indicated that they had no plans to use computers in the future, and 3% of the respondents indicated nothing (p. 508).

These findings reflect the increases in computer use that were occurring as a result of the microcomputer's rapid proliferation. However, as in Olsen's (1980) survey, the most common reason stated by Craven and Sinyor's (1987) subjects for not using computers was still a lack of funds. Additionally, respondents expressed a reluctance to explore CALL due to very little administrative support.

Craven and Sinyor (1987) found that although computers were being used more frequently, when asked how they were being used to teach languages, 41% of the respondents indicated that they used them for drill and practice, 25% indicated that they used them for tutorials to teach new material, 8% for games or simulations, and 13.5% for "other" purposes (pp. 508, 509). Interestingly, 12.5% indicated that they used computers for word processing (p. 508). In other words, the study revealed that instructors were beginning to recognize the instructional value of using computers and computer software outside the boundaries of pre-packaged language-learning applications. Software such as games, simulations, and word processing was beginning to be used in classes to develop communicative skills. Languages being taught with computers were French, ESL, German, Italian, Slavic (Russian and Ukrainian), Spanish, Chinese, Japanese, Korean, Latin, and Koine (New Testament) Greek (p. 508).

Craven and Sinyor (1987) found that the “other” category of computer use included reading comprehension 3% of the time, composition aids 2%, communications networking 2%, text analysis 1%, vocabulary 1%, information collection 1%, testing 1%, other types of drills 1%, and course material for advanced French students developing their own CALL 1% (p. 509).

Craven and Sinyor (1987) were encouraged by the fact that CALL use seemed to be on the rise in Canada, with 33% of teachers reporting they used computers for teaching languages, and another 45% reporting that they planned to use computers in the near future (p. 508). However, CALL applications were still essentially restricted to drill-and-practice and tutorial software. In addition, Craven and Sinyor (1987) note an increase in software development by individuals or teams at different universities, but these developers seemed unaware of each other’s work. This situation reflected the condition in the 1980s when microcomputer ownership was expanding so rapidly that many individual researchers launched out on their own developing programs within and intended for their local contexts. Finally, the results of this survey also suggest the beginnings of the computer’s use in networked communications.

The growing popularity of the microcomputer accompanied a theoretical change in SLA research from a behavioral to a more cognitive perspective. This shift, and in particular the influence of Stephen Krashen’s theory of language *acquisition,* compelled second language teachers to begin looking for, or developing their own, language software that was more acquisition-oriented. However, they soon found that quality software with a more cognitive focus was neither easy to write nor easy to find. The software produced by teachers was often pedagogically sound but quite technologically unsophisticated. Usually such teachers neither had the time nor the expertise to become expert programmers. In contrast, commercial software, usually written by programmers who had no training in language teaching, was often pedagogically unsound (Ahmad *et al.*, 1985; Underwood, 1984). Another failing of the software created by these early microcomputer CALL developers was the disregard for the wisdom learned from past mistakes. Chapelle (2001) claims that as a result of the attention given to Krashen's dichotomy between *learning* and *acquisition*, much of CALL's early contributions were lost because they were considered to be too learning-oriented (instead of acquisition-oriented) and thus irrelevant to CALL's future.

Frustration with the progress of CALL in the early 1980s led Underwood (1984) to suggest a number of guidelines for CALL software developers. He advised that CALL software (a) focus more on using language for communication than on learning forms, (b) teach grammar implicitly, (c) require the learner to generate rather than mimic language, (d) guide students to find the right answer when they are wrong, rather than telling them the correct answer, (e) use the language being learned exclusively, (f) allow the student to explore and discover, and (g) create an environment that stimulates natural language use (Underwood, 1984, pp. 52-54). Moreover, Underwood was one of the first to recommend using computer games and other activities that require collaborative learning to provide interactive contexts for language acquisition (Underwood, 1984).

Stevens (1989) suggested similar guidelines for the production or selection of CALL software. He recommended that CALL software be chosen based on the principles of intrinsic motivation, true interactivity, and eclecticism. He suggested that using computers as tools in contexts in which the language learning is incidental to a larger, more meaningful task would make an activity more motivating. In addition to using programs that promote interaction with the computer itself, he called for the development of programs that provide opportunities for interaction between and among users. Finally, he advised teachers to look beyond software produced strictly for language learning and discover ways to use non-language-learning software in their teaching.

Johnson (1985) also suggested that language learning should be a by-product of computer-based activities. Since so much of the CALL software of her time was of the drill-and-practice variety, she advocated using authentic computer activities as a basis for interactive tasks with pairs or groups of students. "Computer activities," she argued, "can serve as a catalyst that brings students together to interact, negotiate meaning, and negotiate strategies related to the task at hand" (Johnson, 1985, p. 43).

In 1991, Levy (1997) conducted a worldwide survey of CALL professionals to explore the conceptual framework of CALL. He distributed 213 questionnaires and 104 were returned, a 48.8% return rate (p. 120). He used a purposeful sampling technique in which he initially selected CALL practitioners known through their publications, conference participations, or CALL materials developed: they were not necessarily teachers. Subsequently, additional respondents were identified through the recommendations of the original contacts.

Although Levy's (1997) primary focus was on issues related to the development of CALL materials, he also investigated issues related to CALL use. As it turned out, 97.1% of the CALL authors he surveyed were also practicing teachers (p. 120). The preferred language teaching philosophy reported was the communicative approach, with approximately 75 respondents (of 104) indicating they used it along with other approaches (p. 123, fig. 5.1). The survey revealed that most respondents were eclectic in their teaching philosophy and approach with 95.2% of the respondents selecting two or more approaches, and 35.6% selecting four or more (p. 123).

Levy (1997) also queried his respondents about the roles teachers should play in CALL implementation and development. Regarding the teacher's presence when CALL is implemented in the classroom, 79.8% felt that CALL was valuable with or without a teacher present, 10.7% felt CALL was only worthwhile without a teacher present, and 5.9% felt CALL should only be used when a teacher is present (p. 138). The remaining 3.6% were neutral on the issue.

Regarding changes to teachers' roles in the classroom, Levy (1997) found that of the 81 respondents who answered this question, 49.5% felt that the computer had modified their roles, predominantly by taking over more repetitive tasks, such as drill-and-practice exercises (p. 138, table 5.4a). These results would seem to indicate that, although many considered computers to be most useful as a tool, CALL was still primarily valued as an adjunct activity to relieve the teacher of having to use class time for activities such as drill-and-practice activities.

Of the 33.3% who claimed that the computer had not modified teachers' roles, 37% asserted that teachers' roles would be changed in the future due to the computer (p. 138). As for materials development, 73.2% responded that teachers should be involved in writing CALL materials, particularly support materials to accompany CALL software. However, 52.4% saw no need for teachers to learn a programming language (p. 141).

Levy (1997) found that the major barriers to the development of CALL materials included a lack of time (35%) (including time for staff training); a lack of funds (24%) for hardware and software purchases, and funds for providing time for the development and training of staff; and, a lack of teacher training (10%) (p. 145, table 5.7). Eight per cent of the responses indicated "Teaching staff perceptions of CALL" (p. 146) as a barrier, and Levy states that these responses indicate that many teachers at the time were still very skeptical of CALL's usefulness and value (Levy, 1997).

Finally, Levy (1997) found that attitudes concerning the role of the computer in CALL were quite different from what had been found in previous surveys, demonstrating the shift that had been called for from using the computer as a tutor to using the computer as a tool in CALL. The choices from which respondents selected included use of the computer as a surrogate teacher, an expert system, a database, a communication aid, a manager of tasks, a complement to class, for language practice, for raising awareness, and as a tool. In their responses, over 90 respondents selected use of the computer as a tool, while only approximately 25 respondents selected use of the computer as a tutor (the exact numbers were not indicated in the results) (p. 128, fig. 5.2).

The distinction between using the computer as a tool to accomplish tasks as a part of the learning activity and using it as a tutor to teach or drill material was drawn from Taylor (1980). Speaking of computers in education in general, he suggested that computer use be classified according to one of three modes: tutor, tool, and tutee. As a tutor, the computer is programmed to deliver instruction, provide information to the student about the subject, and evaluate answers and provide feedback. This is the mode that became predominant during the early years of computer-based instruction (CBI) and

CALL. In the tool mode, the computer is viewed as a useful, educational instrument—for example, as a word processor. Taylor warns, however, that this mode does not inherently have any effect on learning. When used as a word processor, it is up to the teacher to integrate the computer into the learning activity in a meaningful way. The third mode, using the computer as a tutee, requires that the student teach the computer by learning a programming language and creating either a tutor- or a tool-type application. For example, the student could create a program to teach a list of vocabulary (Taylor, 1980).

Troutman and White (1988) also identified three similar categories of computer use in education. Computer Directed Instruction (CDI), similar to Taylor's (1980) tutor mode, is the use of the computer to provide self-contained instruction to the student. Once the student begins the lesson, there is usually little or no need for further attention on the part of the teacher. Computer Enhanced Instruction (CEI), similar to Taylor's (1980) tool mode, refers to the use of the computer to create instructional materials or the use of computer applications (as tools) to complete learning tasks. Finally, in Computer Managed Instruction (CMI) the computer is used to manage student information, as well as to monitor students' progress through the content to be learned.

Of the three modes, the computer as tool, or CEI, seems to have steadily become the most popular in CALL. In 1999, Richmond claimed that two distinct streams within CALL had emerged: dedicated CALL (tutor), or software that was developed specifically for language learning, and integrated CALL (tool), software that was designed for other purposes but used for language learning tasks. Of the two streams, dedicated CALL had seemed to have little success, primarily due to the inferior quality of the software as well as the failure of developers to incorporate developments in the field of Second Language Acquisition into their programs. The CALL software produced was still, for the most part, traditional drill-and-practice language exercises created by individual teachers or small groups of teachers for their individual language courses.

Richmond (1999) suggests that a further barrier to dedicated CALL's success is the limited availability of expertise for and the high cost. of developing quality large-scale multimedia applications. Today's students, raised in a world of hi-tech computer games capable of virtually simulating any possible reality, have high expectations of the software they use; thus, their interest is not easily held by educational software that lacks the same degree of sophisticated special effects. However, such software usually requires a team of content providers, programmers, and artists: a combination that makes the production of stunning language-learning software too costly for most institutions to develop on their own. These costs cause most commercial software companies to show little or no interest in developing CALL software as well.

Another problem with dedicated CALL software is the fact that authentic communication with the computer cannot yet occur because computers cannot generate language in the same way that people can. Recognizing this limitation of computers early on, Underwood (1984) asserted that Artificial Intelligence would be needed to develop truly communicative CALL tutorial programs. At the moment, a type of simulated interaction using pre-programmed responses to the user's input is the best interaction that the computer alone can provide. Currently, the only conditions under which authentic interactive computer-based communication can occur are when the computer is a part of a collaborative activity involving two or more users, or when the computer is connected to a network and used as a tool to communicate with other users also connected to the same network.

The increasing emphasis on the opportunities for authentic communication in second language learning, the growth of the Internet and local area network (LAN) technologies, and the expanding capabilities of the personal computer throughout the 1990s has led to a new type of CALL. The Internet provides greater opportunities for learners to instantly access vast sources of multimedia information, as well as other learners, from around the world (Levy, 1997). This incorporation of networking into CALL has changed the role of the computer in many CALL activities from sole interactor to facilitator of learner-learner interaction (Chapelle, 2001).

For example, computers connected to the Internet can enhance FL learning by enabling students to communicate with each other through either synchronous (at the same time) or asynchronous (at different times) modes. Labeled "computer mediated communication" (CMC), this form of computer use in FL learning introduces opportunities for authentic communication, as students use the computer as a tool to communicate with other learners (Warschauer, 2000).

Although some progress has been made in the development of intelligent computers capable of authentic communication with people through natural language, CMC seems to hold much promise for the future of CALL. CMC has grown from being limited to text-based interactions to include video and audio modes (Godwin-Jones, 1997). As the Internet evolves, videoconferencing, whereby students communicate virtually face to face with native speakers of the target language, regardless of their location, is providing even more authentic communicative contexts (Blake, 2009; Levy, 2009).

In 1998, Craven and Sinyor's second survey of Canadian CALL-using teachers found that indeed, CMC was gaining in popularity. Almost half (42%) of the respondents indicated they used email, 12% used listserves, seven percent used Internet chat, and two percent used conferencing software with their students (p. 320). The former two modes of CMC are representative of asynchronous communication, while the latter two are representative of synchronous communication. The greater preference for asynchronous modes of communication may reflect students' need for time to contemplate and edit their messages before submitting them to other users. The real-time, immediate response necessary for participation in a chat or online conference appears to be more intimidating (Craven & Sinyor, 1998).

Craven and Sinyor also reported that computer use was up significantly in 1998, with 84% of the respondents using computers in their teaching (as opposed to only 33% in 1987) (p. 319, table 1). The languages that were being taught using CALL were similar to those reported in their initial study, but the Slavic languages and New Testament Greek and Latin were not reported at all. Spanish and ESL users had more than doubled, with French increasing by approximately 50% (p. 319).

With regard to the uses of CALL, the study revealed that, although drill-and-practice software was still the type most often used, it had fallen significantly from the 41% reported in 1987 to only 16.8% of the software used for language learning in 1998 (Craven & Sinyor, 1998, p. 319). Using computers for cultural enhancement was the second most popular reported use (12.9%), while reading comprehension was third at

11.9% (p. 319). The fourth, fifth, and sixth ranked uses of computers in FL learning were word processing (11.4%), listening comprehension (10.2%), and vocabulary (10%), respectively (p. 319). Games and simulations were seventh at 9.5%, dictionaries and translations were eighth at 8.8%, and phonology software and testing/placement came in ninth and tenth, respectively, with a reported 5.6% and 2.9% usage (p. 319). These results indicate that the computer was being used in a variety of ways far beyond the traditional drill-and-practice mode found to be so prevalent in their first study. This reflects the change in attitude toward computer use from one that sees the computer as primarily a substitute teacher to one which sees the computer as a tool.

Craven and Sinyor (1998) also asked several open-ended questions about what teachers and students liked and disliked about using computers in FL learning. After categorizing the comments, they found two themes that deserved special note. First, a number of respondents emphasized the use of the computer as a teaching and learning tool, arguing that FL teaching and learning is a human endeavor and that the computer, in and of itself, is only a tool. Second, several respondents specifically mentioned that computer use needed to be completely integrated into the course material or the students' motivation would fail.

More recently, computing technologies, or rather Information and Communication Technologies (ICT), are making it possible to move some CALL activities from the language laboratory to mobile devices such as personal digital assistants (PDA) and mobile, or cellular, phones. Cellular phones have become small computers, with the ability to display full-color text and graphics on a screen, albeit a small one. PDAs have larger screens and somewhat more sophisticated functions than cellular phones (although the gap between the two is quickly shrinking), and with the development of operating systems specifically suited to these devices and wireless connectivity, they are nearing the capabilities of many desktop computers that would have been state-of-the-art only a few years ago. Although these devices are not yet fully mainstreamed in foreign language learning, many exploratory studies have revealed a number of ways in which these tools can be utilized for activities ranging from traditional practice to fully communicative tasks (Samuels, 2003; Shih & Mills, 2007; Thornton & Houser, 2005)

Efficacy of Computer-Based Instruction

As can be seen from the previous overview of computer use in FL learning, many resources have been invested through the years in the continuous development of better ways to use the computers that have become so pervasive in education. Roblyer (1988) claimed, “The children of our society will never again know schools without computers” (p. 11). With such widespread use of computers comes the demand for an ever-greater commitment of financial and personnel resources. With justification, educators, administrators, and the general public demand to know if computers in education work. Does computer-based instruction provide benefits that justify its cost?

One of the earliest attempts to answer this question was an evaluation of the PLATO and TICCIT systems carried out by the Educational Testing Service (Magarrell, 1978). This study found that, even though both students and teachers reacted favorably to the PLATO and TICCIT systems, there was no significant difference between the systems and the teacher-taught classes in terms of student achievement.

Throughout the years, thousands of studies in general education comparing computers with other instructional media, as well as a number of reviews and meta-analyses of such studies, have been completed with varied results. Many studies have shown CBI to be somewhat beneficial for students. Determining exactly what those benefits are has been more difficult. Generally, the reviews and meta-analyses of these studies indicate a number of general trends from the use of CBI, namely decreased learning time, more positive student and teacher attitudes, and a greater efficacy of CBI when used with a teacher rather than as a substitute for the teacher (Dunkel, 1991; Kulik, 1994; Roblyer *et al*., 1988). However, because of variability in research methodologies, teacher behaviors, and materials design, these findings are not unequivocal (Roblyer *et al.*, 1988).

The question of computer effectiveness in education is too complex to be answered through an investigation of merely whether one medium is more effective than another. Nevertheless, there seems to be little decline in the number of studies conducted in which one medium is compared to others. In a review of technology use in distance learning, Russell (1999) provides an annotated bibliography of 355 studies that investigated the efficacy of one medium over another in distance education. In all cases, there was no significant difference among the media. Because this lack of a significant difference is prevalent in the vast majority of comparative media studies, Russell characterized these findings as "The no significant difference phenomenon," (Russell, 1999). Russell also maintains a website that provides an updated list of subsequent studies revealing no significant difference between media as well http://teleeducation.nb.ca/nosignificantdifference (Retrieved on January 4, 2004).

Clark (1983, 1985) contended that the lack of clear and consistent results from such studies is due to the nature of the studies' designs. He argued that comparing one medium to another was wasted effort because media are merely vehicles of delivery having no more influence on learning than the truck that delivers one's groceries has on one's nutrition. In a 1985 examination of a previous meta-analysis of over 500 CBI studies, Clark identified a number of confounding variables that he believed explained most of the increased achievement seen in the CBI groups.

Clark (1985) discovered that 75% of the studies used in the original meta-analysis had significant design flaws that could have possibly confounded the results (p. 259). For example, in over 50% of the studies, the CBI groups received instruction while the control groups received none (p. 256). Thus, the better performance by the CBI groups could not be clearly attributed to the fact that their instruction was by computer. Furthermore, when Clark separately examined only the studies in which the teacher taught both the control and treatment groups, he found no significant difference between the two groups. Likewise, in the studies that included controls for teaching method and content, the control groups actually performed slightly better than the CBI groups (p. 257).

Clark (1985) concluded that any achievements that seemed to result from the use of computers were more likely the result of either the method of instruction or the different content in the CBI treatments. Therefore, he has continually maintained that research comparing one medium's effect on learning with another's is fruitless, and research investigating the effectiveness of teaching-learning strategies within a given context is a more productive approach (1983, 1985, 1994).

In response, Kozma (1991) claimed that research examining the impact of different media on learning is legitimate because each medium has specific characteristics that make it more or less suited to specific learning contexts. He argued that Clark's conceptualization of the medium as being only a tool for the delivery of information was too confining. Instead, Kozma viewed learners as interacting with the medium in the larger context and process of constructing knowledge.

Indeed, different media have different characteristics that either enhance or diminish the information they present. Whether or not learning occurs when a particular medium is used depends on how the medium's capabilities are utilized and how its capabilities fit the particular context. If the learning content presented takes advantage of the characteristics of the medium used, then the learner can more effectively construct knowledge. As Kozma (1991) asserts, "Within a particular design, the medium enables and constrains the method; the method draws on and instantiates the capabilities of the medium" (Kozma, 1991, p. 205). Thus, to best accomplish an educational task, Kozma calls for the examination of the "fit" between a specific medium and any given method.

Similarly, the results of research into the efficacy of computer use in FL learning have also not been clear (Dunkel, 1991), primarily due to the insufficient number of empirical studies of student performance when using CALL. Nevertheless, Olsen (1980) reported that in all situations involving CALL, both teachers and students expressed positive attitudes toward CALL. In that same year, Hope, Taylor and Pussak (1980) found that virtually every CALL study reported anecdotally that students were more satisfied and had more positive attitudes toward the use of computers in FL learning.

In 2002, Nutta *et al.* reported that students who studied Spanish using computer-enhanced multimedia instruction were more involved in the learning process and more willing to spend a greater amount of time learning the target language. The researchers also noted greater precision in the work of the students, but statistically they found that there was no significant difference on post-test performance between the students using text-based instruction and those using the computer-enhanced multimedia instruction. However, they did find a significant difference between the two groups on a delayed post-test in favor of the computer-enhanced instructional medium. Nutta and her colleagues suggested that the participants who studied using computers retained what they had learned more effectively than did the text-based group of students. Furthermore, case studies of the participants revealed a trend of better reading and pronunciation performance from the computer-based group. These observed tendencies merit further study involving a greater number of participants to provide more generalizable results.

In examining empirical studies of the effectiveness of CALL, Pederson (1987) found that while many studies show positive results, a number of them comparing CALL instruction to traditional instruction showed no significant difference between the two groups. Like Clark (1985), Pederson, implicates the tendency of researchers to ascribe learning advances to the medium (the computer) rather than to the way in which the medium is used (the entire lesson context). He asserted, it "is difficult to account for all the possible causes for learning attributable to one medium or another" (p. 106).

Chapelle and Jamieson (1989) also claimed that studies in which a CALL method is compared to a traditional method of instruction produce mixed results because they fail to adequately consider the impact that learning tasks, learner characteristics, and the characteristics of the media have on the study results. They called on researchers to focus instead their attention on the learning processes, learner characteristics, and lesson features that are conducive to second language learning.

Chapelle (2001) more recently has recommended that, rather than trying to measure the effectiveness of computers as a medium, CALL evaluation begin with a consideration of the appropriateness of a specific CALL task at a specific time for a particular group of learners. This involves three levels of evaluation: (a) evaluation of the CALL software, (b) evaluation of the context in which the teacher plans to use the CALL activity, and (c) evaluation of the student processes and outcomes that occur during the CALL activity. Then, drawing from theory and research on tasks for instructed Second Language Acquisition, she outlines a number of parameters that guide one in each of the three levels of evaluation.

1. Language learning potential. Do the CALL activities generate language-learning opportunities that provide meaningful focus on form (as opposed to only providing opportunities for language use)?
2. Learner fit. Are the activities appropriate to the learners' proficiency level?
3. Meaning focus. Is the learners' primary focus on the meaning of the language required to complete the activities?
4. Authenticity. What is the degree of correspondence between the activities and situations the learner may encounter outside the classroom?
5. Positive impact. Do the activities have any positive effect beyond the language-learning opportunity?

6. Practicality. How easy is it for the learners and the teacher to carry out the activities? (Chapelle, 2001).

Is CALL effective? Although research into CBI and CALL efficacy has demonstrated a number of positive trends, the question requires more than a comparison of one medium with another. A number of researchers (Chapelle, 2001; Chapelle & Jamieson, 1989; Dunkel, 1991; Pederson, 1987) have suggested that the way the computer is actually used—that is, its integration into the curriculum—needs to be considered to resolve issues of efficacy. CALL's benefits can be increased by employing guidelines such as those recommended by Chapelle (2001) to examine specific CALL activities in specific contexts with specific groups of learners.

Integration of Computers into the Curriculum

If the efficacy of computers in second language learning depends largely on the ways in which they are integrated into the curriculum, then it is necessary to have a clear concept of what is meant by "integration of computers into the curriculum." It may be as little as taking students to a computer lab once a week, allowing them to visit a computer station as a reward, or even using the computer for "worksheet" activities. Egbert (2005) defined the integration of computers for FL learning as "learners learning language in any context, with, through, and around computer technologies" (p. 4) At the other end of the spectrum, Dias (1999) describes integration as using technology in a "seamless manner to support and extend curriculum objectives and to engage students in meaningful learning" (What Is Technology section, ¶1), and Garrett (2009) suggests that integration of computers into FL learning involves "a dynamic complex in which technology, theory, and pedagogy are inseparably interwoven" (p. 720). The degree of computer integration into the curriculum may better be expressed along a continuum rather than as a dichotomy.

Many recent conceptualizations of computer integration into the curriculum portray computers as tools to be used in the learning process. Rather than fulfilling the role of a surrogate or replacement teacher, the computer is considered to be a part of the larger learning context (Cheung, 1987; Coleman, 1996; Dillemans, Lowyck, Van der Perre, Claeys, & Elen, 1998; Kramer *et al.,* 2009; Hanson-Smith, 1995; Levy, 2009; Levy, 1992; Magrath, 2001; Meskill & Mossop, 1997; Murray, 1998; Sandholtz, *et al.*, 1997; Tutunis, 1990). Warschauer (1998) labeled this type of computer integration "integrative CALL" (p. 58). Within this approach, students use technology throughout the second language learning process, not merely in a weekly lab visit to perform isolated drills.

This type of CALL fits particularly well with communicative socio-cognitive SLA approaches that stress the engagement of students in authentic communicative activities and the simultaneous integration of second language learning skills in any given task (Warschauer, 1998). An example of this type of integration can be found in Cheung (1987) in which he reports on a CALL project based on a non-communicative, text-based multiple-choice program. Instead of merely using the workbook-type program, he created an activity that required the students to work in small groups, utilizing all of their language skills and the computer as a research and word-processing tool to create data files for use with the multiple-choice program. In this way, the computer and the more traditional text-based computer program were used in an activity that required authentic communication and collaboration.

Hanson-Smith (1995) describes a process of computer integration that consists of three levels based on the indispensability of the computer for the particular task. At the first level, students familiarize themselves with the computer's capabilities as a word processor or spell checker. At this level, the computer is convenient, but not necessary for completion of the task. At the second level, students and teachers start to use the computer to accomplish tasks that would not be easily addressed with pen and paper, such as searching through texts on the Internet. Finally, at the third level, the computer is integral to the completion of the task. Email keypals represent an example of computer use at the third level. Simulations and discovery or exploratory learning would fall into this category as well.

At the highest level of integration teachers strive to create tasks that can only be tackled using the computer. They begin to conceptualize ways to integrate the computer into their teaching in order to enrich it. Their goal is to engage students in learning contexts that would otherwise not be logistically possible, through hypertexts, multimedia animations, and interactive video. The computer becomes an indispensable part of the learning (Hanson-Smith, 1995).

An even more detailed description of the stages of integration is provided by Sandholtz *et al*., (1997). In reporting on the ACOT project, they describe stages through which teachers proceeded over a 10-year period as they integrated computers into their teaching. These stages include entry, adoption, adaptation, appropriation, and invention.

At the entry stage, instruction was traditional and teacher-centered as teachers began to learn how to use computers in their lessons. As they attempted gradually to integrate computers into their teaching, they expressed less concern about instruction than about classroom dynamics and management. Also observed was concern as to how to begin using the computers in class. A number of teachers questioned the viability of using computers in their teaching. At this stage, teachers needed encouragement lest they not move forward in the process (Sandholtz *et al.*, 1997). The CEO Forum (1999) adds that at this stage, someone other than the teacher often determines student use of computers. For example, the students may have lab time that is supervised by a designated computer teacher, or teachers may have computers in their classroom that are used independently by students during assigned times. Dias (1999) further suggests that, in the early stages of integration, teachers require support from staff and peers as well as much more time for planning.

In the second stage, adoption, teachers began to mix computer-based activities with their established teaching methods. These activities were primarily focused on how to use the computers, such as keyboarding and word processing skills. For example, as teachers discovered the usefulness of word processing software, they began introducing opportunities for students to use the computer as a “better typewriter” (CEO Forum, 1999, p. 14). At this stage as well, instructors showed more interest in techniques for using computers during class, and, in fact, began experimenting with spreadsheet and database software in their teaching. Nevertheless, the computers were still used primarily in support of traditional, direct instructional methods (Sandholtz *et al.*, 1997).

In the third stage, adaptation, researchers noted greater integration of computers into what was still a traditional approach to teaching. Computer use became more frequent and more purpose-driven, and students became more productive as they learned to use the computers as tools in their learning. At this stage, the students were working on the computers for 30% to 40% of the day (Sandholtz *et al*., 1997, p. 40). Student use of the Internet or online encyclopedias is an example of activity at this stage. Another example is teacher use of Web sites to present subject matter to the class. However, at this stage, the teacher still directs students' technology use rather than allowing "student-directed learning experiences" (CEO Forum, 1999, p. 14).

According to Sandholtz *et al.* (1997), the fourth stage, appropriation, represents more a personal transitional point. At this stage, teachers' attitudes were observed to change as they came to regard computers as tools for accomplishing teaching goals. Sandholtz *et al.* (1997) claim out that common statements from teachers at this stage, such as the following, reflect appropriation: "My day unconsciously revolves around the use of computers" (p. 43). "I appreciate how [the computer] lets me function better as a teacher, . . ." (p. 43). "It would be hard to live without a computer" (p. 43). This point signals the end of teachers' attempts to simply integrate computers into their traditional teaching methodology and opens the door to more innovative approaches. According to Dias (1999), this change eventually leads to an increase in project-based instruction. Students using computing technologies at this stage view them as a tool to accomplish their tasks. They may use the Internet or e-mail for research, word processing for writing up the research, and presentation software for sharing it (CEO Forum, 1999, p. 15).

In the final stage, invention, Sandholtz *et al.* report that teachers tried new instructional strategies for guiding their students and came to realize their role as more of a facilitator than as an information disseminator. They questioned familiar methods and created new ones as they reflected on the changes in the way their students were learning. An invention-stage activity might involve a semester-long class project to create a web site. The production of the site may involve many smaller projects requiring the students to learn deeply about the content subject matter, principles of communication and presentation, organizational and writing skills, as well as research skills (CEO Forum, 1999, p. 15).

These stages provide a scale to gauge the degree to which computers have been integrated into a curriculum at any given time. To obtain the highest degrees of integration, instructors have been observed to change their instructional practice and, presumably, their underlying instructional philosophy. Changes of this magnitude require time and technology support that involves more than the maintenance of computer hardware and software (Glennan & Melmed, 1996; Kramer *et al.,* 2007; NCES, 2000; OTA, 1995; Report to the President, 1997; Ronnkvist, *et al.*, 2000; Sandholtz *et al.,* 1997).

Technology Support

The 1995 OTA study identified a number of aspects of technology support that go beyond basic knowledge of computers and technical support. It includes as well time to experiment and access to technology support personnel. The attention given to rich technical support was echoed in the 1997 Report to the President. It called for support personnel who could provide assistance with the "deeper pedagogic challenges" (Section 5.2) involved in computer use in teaching, such as choosing software to accomplish curricular goals, creating projects that utilize technology, and helping students learn how to use computer-based resources.

The CEO Forum School Technology and Readiness (STAR) report (1999) identifies the need for continuous professional development involving more than simple one-time workshops. It indicated that access to technology in the nation's schools has improved sufficiently to the point where attention should now be turned to teachers' use of technology to improve their students' performance. To this end, they argue for superior ongoing, long-term professional development with follow-up that focuses on the use and integration of technology to meet students' needs. To do so, schools or departments must 1) set relevant goals that will enable teachers to use technology to improve student performance, not just learn to operate the technology, 2) involve not just teachers, but administrators and key individuals as well, 3) link the professional development to real teacher and student needs and objectives, 4) model best practices by using technology to teach and provide examples, 5) encourage learning by doing through practical, hands-on experiences, and 6) provide resources, incentives, and ongoing technical support (p 17). Continuing professional development of this magnitude is necessary in the complex and rapidly changing field of technology use in education.

All of these reports, however, identify an even greater need in the area of technology support. Given adequate computing hardware and software, technical and pedagogical support, and quality professional development opportunities, there still remains a significant challenge to increased computer use in teaching: a lack of time. Teachers require sufficient time to participate in professional development and to apply what they learn in the creation of lessons using the technology. Even highly motivated teachers who are eager to utilize technology need substantial amounts of time over a three- to five-year period before they feel competent in using technology to accomplish their teaching goals (OTA, 1995).

A 1999 nationwide survey of public school K-12 teachers found that, overall, lack of time was reported to be one of the most serious support issues standing in the way of greater computer integration. Inadequate time to gain hands-on experience using computers and to develop classroom materials was reported by teachers (82%) to be more of a barrier to computer use in instruction than any other perceived barrier, including a lack of computers (78%), a lack of pedagogical (68%) or technical (64%) support, and a lack of professional development opportunities (67%) (NCES, 2000, p. 92). When asked to classify these impediments as either great, moderate, or small, 37% of the teachers indicated that lack of time was a great barrier. The only impediment identified as a greater barrier was a lack of computers, receiving 38% of the responses, merely one percentage point higher than a lack of time. Interestingly, only 18% of the teachers reported that both a lack of pedagogical support and a lack of professional development opportunities were great barriers, and only 16% believed that a lack of technical support was a great barrier (NCES, 2000, p. 92).

The existence of an adequate computing infrastructure in the form of up-to-date hardware and software is apparently of little use unless teachers are given the time and opportunities to learn how to integrate it into their instruction. In fact, there are clear indications that without the necessary technology support, computers will remain greatly underused (CEO Forum, 1999; NCES, 2000; OTA, 1995; Report to the President, 1997). As the CEO Forum year 2 report advocates, great strides have been made in the reduction of computer to student ratios, and resources spent per student have increased dramatically; however, “the transformation of classroom technology from hardware, software, and connections into tools for teaching and learning depends on knowledgeable and enthusiastic teachers who are motivated and prepared to put technology to work on behalf of their students" (1999, p. 5).

Preparing motivated, knowledgeable, and enthusiastic teachers will clearly require more aspects of technology support than basic technical support. One of the most comprehensive descriptions of technology support is provided by Ronnkvist *et al.* (2000) in their report on support and its relationship to teacher use of technology. They suggest that technology support consists of two aspects: its content and the method by which it is delivered. Content includes instructional content—that which is focused on pedagogy and the implementation of technology through different teaching methods—and technical content—the operation and troubleshooting of hardware and software. Methods of delivery include the computing infrastructure, technology support staff, one-on-one assistance, professional development opportunities, and incentives. The provision of both types of content by means of the various methods is illustrated in Table 1.

In examining the data from the 1998 Teaching, Learning, and Computing survey, Ronnkvist *et al.* (2000) concluded that "successful integration of technology into the classroom requires the availability of quality technology support" (p. 27). This technology support must include technical support, and the computing infrastructure must be in place and available; however, it must include much more as well. It must include both technical and pedagogical domains. If it is to be truly effective it needs to be directed by a technology coordinator familiar with both the technical and pedagogical aspects of support. Finally, it must include ample time and opportunities for teachers to learn about and use technology.

Table 1

Aspects of Technology Support

	Content	
Method	Instructional	Technical
Computer infrastructure	Content-area specific software, availability of computers for practice integrating technology	Computers (hardware & software) and Internet access
Technology support staff	Instructional support; ability to help teachers integrate computers in their teaching	Technical support; maintaining computer and Internet availability
1-on-1 assistance	Individualized assistance integrating computers into the curriculum	Individualized assistance operating computers; troubleshooting
Professional development opportunities	strategies for integration of technology into teaching; project-based instruction	Operating computers, software, basic troubleshooting
Incentives	Release time to create lessons integrating computers. Awards & recognition for using computers in teaching	Release time to experiment with hardware and software; provision of additional hardware/software resources

Note. Adapted from Ronnkvist, *et al.* (2000). *Technology support: Its depth, breadth, and impact in America's schools*. Irvine, CA: Center for Research on Information Technology and Organizations, University of California, Irvine and the University of Minnesota, p. 3. Retrieved January 2, 2004, from http://www.crito.uci.edu/tlc/findings/technology-support/report_5.pdf .

It is clear from the literature that if high levels of computer integration are to occur in K-12 classrooms, rich technology support is required. In the field of adult FL, teachers have indicated their belief that if computers are to be used effectively, they need to be integrated completely into the course material and used as tools (Craven & Sinyor, 1998; Johnson, 1985; Stevens, 1989; Underwood, 1984). The following section of this literature review will demonstrate that current theory in the field of SLA strongly advocates that computers will best serve second language learning if they are integrated into the curriculum. However, as Ronnkvist *et al.* (2000) have shown, such integration, at least at the K-12 level, requires extensive technology support. Is greater integration worth the resources?

SLA Theoretical Underpinnings of Computer Use in FL Education

When computers were initially used in second language learning, virtually all of the lessons consisted of question-and-answer, drill-and-practice formats that had grown out of Behaviorism's Programmed Instruction (PI) and the Audiolingual Method (ALM) of second language learning.

PI, particularly influential in early CALL, emphasized breaking content knowledge or skills into minimal components and subsequently teaching the content as a series of discrete steps learned at the student's own pace and with immediate, impersonal feedback (Ahmad *et al*., 1985; Stevens, 1989). Littlewood (1974a), however, expressed a concern that language could not be adequately learned through this method. He pointed out that, in actual use, language consists of an integration of a large number of skills and content. He questioned whether or not content presented in fragments could then be reconstituted into the structures and knowledge necessary for proper understanding and use.

ALM, perhaps the most popular application of Behaviorism and PI, drew upon the belief that second language learning essentially consisted of the formation of habits and skills. ALM focused on developing FL habits by means of pronunciation mimicry, grammar pattern drills, and dialogue memorization and recitation. The drill-and-practice exercises advocated by ALM were particularly suited to the capabilities of the computers at that time (Levy, 1997).

ALM allowed for very little or no explicit grammar instruction or for use of the native language. The target language, or TL, was broken down into structures, and these were learned orally one at a time with almost no reading or writing. However, as psychologists realized that second language learning involved more than habit formation and linguists acknowledged that breaking a language down into its component parts does little to explain how it is used creatively, ALM fell out of popularity (Brown, 1987).

Concern regarding the effectiveness of PI and, by extension, ALM grew as an expression of a larger paradigm shift that was occurring in the field of second language learning and its progenitive fields of linguistics and psychology. Throughout the 1960s and 1970s, scholars were moving from a Behavioral approach to a more Cognitive approach to second language learning. As mentioned earlier, the Behaviorists regarded language development as habit formation, or the learning of patterns. They claimed that syntactic and morphological behavior was no more than the result of responses to external linguistic stimuli. Those approaching language learning from a Cognitive perspective, on the other hand, considered language to be the result of internal creative activity based on universal generative rules. Thus, the focus in second language teaching moved from the training of habitual, external, observable language behaviors to the development of internal elements of language—rules—that enabled one to generate unique utterances (Brown, 1987; Ellis, 1994).

Stephen Krashen's theory of language acquisition drew upon this Cognitive approach. He posited that *acquisition* is the subconscious, indirect, and implicit development of a language, while *learning* is the conscious, explicit development of knowledge about the components and rules of a language (Krashen, 1982). Thus, Krashen emphasized the need for *comprehensible input* rather than a focus on grammar rules. Exposure to comprehensible input would enable the learner, or acquirer, to subconsciously and implicitly construct the grammar of the language naturally, thereby giving the acquirer a command of the language that students who had been traditionally taught (i.e. a focus on grammar rules and vocabulary memorization) would find much more difficult to develop (Krashen, 1982).

Dell Hymes (1974) added yet another dimension to SLA theory when he called attention to the fact that, in addition to having the ability to understand and produce any grammatically correct utterance, one also needs to know the social and pragmatic suitability of the utterance. *Communicative competence* (Hymes, 1974, p. 75) enables one to communicate appropriately in given contexts. Hymes' concept expanded the purview of Second Language Acquisition theory to include not only linguistic knowledge, but also sociolinguistic knowledge, or rules of language use that are dependent on the social context of communication (Brown, 1987). One may know how to form a grammatically correct question such as "How much does your house cost?" and not know when and if asking such a question is appropriate.

Recognition of the social aspect of second language learning was further explored by FL research which demonstrated that language learners encountering new or unfamiliar linguistic input have greater comprehension of that input if given the opportunity to negotiate the meaning being expressed (Pica, 1987, 1991). This suggests that optimally, languages are not learned by means of the rote memorization and drill of vocabulary and syntax, but rather through "modified interactions" (Long, 1983), or authentic exchanges in which the communicants, by adjusting their speech so as to be understood or by using various strategies to clarify what the other is saying, are able to successfully communicate. Sounding similar to Vygotsky's "Zone of Proximal Development" (1978), Pica states, "learners can advance . . . in a second language if they obtain their interlocutor's assistance in understanding linguistic material not currently within their L2 repertoire" (1987, p. 5). Thus, second language learning seems best engendered when the target language is used for genuine communication in an authentic interaction (Long, 1983; Pica, 1987, 1991).

SLA theory has moved from a Behaviorist approach, with its attention to the formation of external new habits of speech, to a Cognitive focus in which emphasis is placed primarily on the internal development of the elements and rules of a language and the mental processes that produce communication. A further shift is underway toward a more Socio-cognitive focus that emphasizes second language learning as a process through which the learner, while developing these mental linguistic abstracts, must also interact with and become a part of the community that uses the TL. Second language learning has become a social, as well as a mental, activity (Warschauer, 1998).

SLA theory has continually influenced the ways in which computers have been and are being used in FL learning. In the earliest days, computers were used for drill-and-practice activities that aided in the learning of the TL's new patterns and habit formation. As SLA theory became more Cognitively oriented, the computer was used in more mentalistic, exploratory learning activities or as a tool to aid in the development of higher-order, internal language skills. Finally, the importance in SLA theory of the need for meaningful interaction with the TL has led to an increasing use of the computer as a tool in the communicative process, allowing second language learners to participate in online communities or within collaborative learning activities.

Today there are many competing theories in the field of SLA, and the computer has been effectively integrated into and met the needs of a variety of curricula based on these different theories. What is needed currently is an all-encompassing theory of SLA that will take into account the strengths of the current competing theories. Complexity theory may be the answer to this need. Larsen-Freeman and Cameron (2008) suggest complexity theory because it, ". . . aims to account for how the interacting parts of a complex system give rise to the system's collective behavior and how such a system simultaneously interacts with its environment" (p. 1).

Modern SLA theories embrace computers as tools to be carefully integrated into the language learning curriculum to create authentic communicative contexts in which interaction, and thus acquisition, may occur. The question to be answered is, what types of technology support will best enable this greater degree of integration to occur in adult FL education?

CHAPTER III:

METHODS AND PROCEDURES

The literature review identified technology support as having a strong relationship with the degree to which computers are integrated into the curricula in general education. The cross-sectional, correlational study described below will examine the level and type of technology support present in college and university foreign language departments in the United States and how that support relates to the extent of computer integration into FL curricula. This chapter is divided into four sections, including the research questions, participant information, instrumentation, and data collection.

Research Questions

As outlined in the literature review, Ronnkvist *et al.* (2000) defined technology support as consisting of technical and instructional content delivered through five aspects of support: computing resources, technology support staff, professional development opportunities, one-on-one assistance, and the provision of professional incentives. The relationships these five aspects of support had with computer integration in K-12 education were examined by Ronnkvist and her colleagues and found to have varying strengths. To evaluate the strengths these five aspects have with the integration of computers in adult FL education they will comprise the elements of technology support that will be examined in this study as expressed in the following research questions:

1) What is the relationship between the availability of computers and the extent to which computers are integrated into the curricula?

2) What is the relationship between the nature of the technology support staff and the extent to which computers are integrated into the curricula?

3) What is the relationship between the frequency and types of professional development opportunities and the extent of integration?

4) What is the relationship between the availability of one-on-one guidance and the extent of integration?

5) What is the relationship between the provision of professional incentives and the extent of integration?

6) What are the relationships between the above-referenced aspects of technology support and the degree of computer integration?

7) For what types of activities do foreign language instructors use computing technologies the most in their instruction?

8) How do instructors' attitudes and beliefs about the use of computing technologies in their instruction correlate with their actual usage?

Participants

The population surveyed for this study were the faculty at four-year colleges and universities in the U.S. offering foreign language or literature programs or majors. Two-year colleges were not included in the population because, according to the U.S. Department of Education's National Center for Educational Statistics (NCES) index of colleges and universities and Peterson's (publisher of the Peterson's guide series of college indices) online database of colleges and universities, the number of two-year colleges with foreign language programs or majors is only 5 to 10% of the total number of two-year colleges in the United States.

The sampling frame was a list of four-year schools providing foreign language programs and majors compiled from the NCES index, Peterson's online database of colleges and universities, and the membership list of the Association of Departments of Foreign Languages (ADFL). After eliminating duplicates from the list, the total number of schools in the sampling frame was 1, 071. These schools represented the qualifying institutions from which the survey sample was selected.

The required sample size was determined using Equation 1 (Dillman, 2000):

$$Ns = \frac{(Np)(p)(1-p)}{(Np-1)\,(B / C)^2 + (p)(1-p)} \qquad (1)$$

In equation 1, Ns = the sample size needed, Np = the size of the population, p = variability, B = the acceptable amount of sampling error, and C = the confidence level Z statistic.

Based on Equation 1, a completed sample of a minimum of 282 schools was needed to achieve a 95% confidence level with a confidence interval of +/- 5%. Anticipating a 50% response rate at the institutional level, a total of 564 schools were selected from the sampling frame of 1071 schools.

To ensure equitable coverage of the United States, a proportional random sample was selected based on region. In the first phase of sampling, qualifying schools were sorted according to the U.S. geographical regions utilized by NCES. To determine the number of schools that needed to be sampled from each regional group, the percentage of the total sample frame that each regional cluster encompasses was calculated. These percentages were then multiplied by the total sample size to determine the number of schools to be randomly selected from each regional cluster.

In the second phase of sampling, the schools in each regional cluster were assigned a unique computer-generated random number ID between 1 and the number of schools in that region. Next, a second list of unique random numbers between 1 and the number of schools that needed to be selected from each regional group was produced. The schools with IDs corresponding to the numbers in the second list became the sample for the study.

Once the schools were selected, the foreign language department's contact information was collected from the school's websites. During this process, it was discovered that 88 of the selected schools had more than one foreign language department, such as separate Romance, Slavic, and Asian language departments. As a result, although 564 schools were initially selected, in actuality 824 separate foreign language departments were contacted. Of these 824 departments, 203 individuals from 88 different departments (a 10.7% response rate at the departmental level) responded, representing 80 separate schools (a 14.2% response rate at the institutional level). This response rate results in a 10.6% sampling error at the level of schools. If an assumption is allowed that each department would have at least two faculty members, a 6.8% sampling error at the level of the individual respondents and a 10% sampling error at the departmental level is obtained. Table 2 displays the states in each region, and Table 3 displays the total number of schools randomly chosen by region and the response rates.

Table 2

States in each sampling region

Region	States
1	Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, Vermont
2	District of Columbia, Delaware, Maryland, New Jersey, New York, Pennsylvania
3	Illinois, Indiana, Michigan, Ohio, Wisconsin
4	Iowa, Kansas, Minnesota, Missouri, North Dakota, Nebraska, South Dakota
5	Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, West Virginia
6	Arizona, New Mexico, Oklahoma, Texas
7	Colorado, Idaho, Montana, Utah, Wyoming
8	Alaska, California, Hawaii, Nevada, Oregon, Washington

An e-mail was sent either to the department chair or the department's contact person for each of the 824 foreign language departments. The e-mail briefly explained the importance of the study and made an appeal to forward the survey information to the entire department faculty along with a request to complete the survey either online or via postal mail. As an incentive to complete the survey, once an individual completed a survey, he could register to win a thirty-dollar money order that was given to each of seven randomly chosen individuals at the completion of the data collection. The funds for this incentive were provided by the researcher.

Table 3

Schools contacted and response rates by region

Region	Schools contacted	School responses	Response rate	Depts. contacted	Dept. responses	Response rate	Individual responses
1	41	3	6%	87	3	3%	5
2	119	12	10%	184	14	8%	30
3	92	15	18.5%	148	16	12%	26
4	60	5	8%	85	7	8%	25
5	134	20	15%	158	20	13%	43
6	45	6	13%	57	8	14%	29
7	17	4	23.5%	21	4	19%	7
8	56	12	21%	84	13	15.5%	32
Total	564	77	13.7%	824	85	10.3%	197

Instrumentation

An online survey instrument was constructed by the researcher to explore the relationships between technology support and computer integration. The principal constructs to be examined by the instrument were initially culled from the literature and grounded in the reality of practice. The constructs selected for measurement were based on the frameworks provided by Sandholtz *et al.* (1999), Ronnkvist *et al.* (2000), and from the researcher's seven years of experience as the coordinator of computing services at an intensive English language program. They included the degree of computer integration, computer availability as an aspect of technology support, technology support personnel as an aspect of technology support, one-on-one assistance as an aspect of technology support, professional development opportunities as an aspect of technology support, and incentives as an aspect of technology support. The questions on the instrument were created by the researcher himself and evaluated and critiqued by focus groups and two subject matter experts before being administered to the respondents.

Prior to the instrument's initial formulation, a focus group was convened with the faculty of an intensive language program for the evaluation of the clarity and depth of the constructs. Each group of three to five faculty and staff members was given a single construct and a list of the aspects of which they were comprised. The members were asked to consider each construct and its corresponding aspects and then respond to a questionnaire asking about the clarity of the construct, whether or not any aspects important to the construct were missing, and whether or not any of the listed aspects of the construct should be eliminated due to irrelevance. Appendix A contains a sample of the proposed constructs along with the questionnaire used by each group in its evaluation of the construct.

Regarding computer integration, the focus group suggested only the addition of an item measuring the frequency of the assignment of homework requiring the use of computers. The focus group felt the construct of computer availability was clear, and indicated that there were no irrelevant aspects of the construct that should be deleted; however, they did suggest that the types of computers available for use with a class (desktops, notebooks on a cart, student's notebooks) might be added. For the construct of technology support personnel, the focus group suggested that the items needed to more clearly differentiate whether or not the technology support person provided technical support, pedagogical support, or both. In addition, they suggested adding the ability to measure the possibility that more than one person may provide technology support, perhaps inquiring as to the existence of separate technical and pedagogical support personnel. The group's evaluation of one-on-one assistance suggested that the construct as presented was complete and was not in need of any changes or deletions, and their evaluation of professional development opportunities resulted in no suggestions for changes to the construct other than the addition of more workshop topics. Finally, the group's consideration of the incentives indicated that the construct was clear and that there were no irrelevant items that needed to be deleted. They did suggest adding items exploring disincentives that may hinder computer use by instructors. The group's role was primarily to inform the development and clarification of the constructs to be measured, and it was not further consulted for actual items to include on the survey instrument. Subsequent to evaluation of the group's feedback in light of the literature, the constructs were revised accordingly.

Following the construct focus group, the survey instrument was created and made available online to a group of students in the Second Language Acquisition and Instructional Technology Ph.D. program. This group consisted of individuals who had professional degrees and experience in teaching foreign languages at the college level. They completed the survey, provided feedback online, and subsequently participated in a focus group led by the researcher in which they provided feedback not only regarding the constructs comprising the variables in the survey, but also the functionality, navigability, and appearance of the instrument.

The changes that were suggested by this second focus group primarily included adding response choices such as "other", "don't know", or "na"; reordering items and response choices; rewording items; or, dividing items into 2 or more questions when more than one concept was being explored in a single item. Some notable contributions from this group included the suggestion to add an "in class" and "outside class" option when exploring the computer activities a teacher assigns, and when asking about technology support personnel, they also emphasized the need to inquire as to whether or not there was more than one person who provided technology support and if so, to evaluate their functions separately.

Based on their feedback the survey instrument was revised and submitted to two experts in the field of computer assisted language learning for their evaluation of the instrument's content validity. Their responses indicated an approval of the survey and suggested minor changes only to the format of a few questions. They also suggested areas of inquiry for future research that could be related to this study. Based on these inputs, the survey instrument was further refined prior to the dissemination of the instrument to the survey participants.

Questions one through six of the instrument measured demographic items about the school with which the respondent is associated and the respondent's teaching. The values obtained from these items provide groupings for the analysis of the measurement of integration and the types of technology support. These items measured the following variables: 1) whether or not foreign language study is required by any students at the school other than those majoring in foreign language, 2) whether or not the school is public or private, 3) the size of the school, 4) the state in which the school is located, 5) whether or not the language taught was also the respondent's native language, and 6) how many hours per week the respondent taught foreign language classes. Responses to item four were separated into categories based on the six regions of the United States as indicated by the NCES.

Data to address the research questions were collected through individual items as well as the development of indices from the items in the survey. Indices were developed whenever multiple aspects of a construct could be identified in and justified by the literature. Each index was further tested for reliability before combining the individual values into a construct score. The data used to examine the reliability were also the data used in the evaluation of the survey results.

The scales created varied in their degree of specificity from four to 12 discreet points of response, depending on the degree of differentiation within the construct being measured. In an attempt to reflect their continuity, items that represented a continuum between two points were constructed with greater numbers of response points than those items with limited, specific categories. Prior to data analysis, all scores from each scale were transformed to a zero to four point scale. The individual items and index scores were divided into six major constructs.

Computer Integration. Computer integration as defined by Sandholtz *et al*. (1999) is a process composed of five stages through which teachers progress: entry, adoption, adaptation, appropriation, and invention. However, Sandholtz and colleagues acknowledged that appropriation is not so much a stage as a transitional point—a change or shift in the teacher's attitude that opens the door to the final stage, invention. Appropriation and invention are virtually identical; therefore, for the sake of this study, these two stages were collapsed together to form one stage: invention.

Sandholtz *et al.* (1999) identified a number of teacher and classroom features at each of these stages of computer integration that can be organized into five broad categories: 1) the frequency of computer use, 2) the types of learning activities for which the teacher uses the computer, 3) the teacher's disposition towards computers in teaching, 4) the teacher's self-confidence in using computers, and 5) the nature of the teacher's interaction with other teachers regarding the instructional use of computers. An index composed of nine items from the survey was created to measure the construct of computer integration as defined by these five aspects.

Frequency of use was measured by two items. Types of learning activities were also measured by 2 separate items; one which measured the respondents' self-perception of the types of activities usually assigned, and one which asked about the frequency of use of 28 different specific types of activities both in and out of class. The respondents' disposition toward computers in second language learning and teaching was measured by three items, and self-confidence and interaction with other teachers were each measured by one item. Frequency of use, the types of learning activities used, and the respondents' disposition toward computer use were all measured by multiple items; thus the values for the items comprising each construct were combined into index scores. The statistical relations among these items were examined using Pearson product-moment correlations, factor analysis, and the Cronbach alpha statistic to ensure that they did indeed comprise an accurate measure of the construct. Once created, these index scores were averaged together with the values from the two single items to create a single value for computer integration that encompassed the five aspects of computer integration as identified by Sandholtz *et al.* (1999).

The two items measuring the frequency of use of computers had a correlation that was significant ($p < .01$) and of moderate strength ($r = .51$), supporting the idea that these items were not isolated dimensions. The Cronbach alpha statistic for these two items was .68 indicating a moderate degree of internal consistency/homogeneity for these items. Based on these statistical relations, the scores from these two items were converted to a zero-to-four-point scale and averaged together to create an index score for the frequency of use of computers.

To measure the types of computer-based activities respondents assigned, two items were constructed. The first item measured the respondents' perception of the types of activities they assigned, with the choices ranging from "Don't assign computer activities" to "Mostly communicative or project-based activities". A second item was composed to measure how often fourteen different types of computer activities were used for both in-class learning and homework (resulting in 28 separate measures). To examine whether or not the 28 items accurately comprised a construct of types of activities assigned, the statistical relations among the items were examined using Pearson product-moment correlations, factor analysis, and the Cronbach alpha statistic.

Because of its size, the correlation matrix for the 28 items is presented in Appendix D ($n = 150$). The correlations were all of moderate strength (the average correlation = .30), supporting the idea that these items were not isolated dimensions. The lowest correlation was between the e-mail, chat activities in-class and games and simulations as homework ($r = -.04$), and the highest correlation was between webquests in class and webquests as homework ($r = .73$).

To further explore the interrelations among the items an exploratory factor analysis was conducted using principal component analysis with varimax rotation. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was .82, Bartlett's Test of Sphericity was significant at .00, and the communalities for the 28 measures ranged from .51 to .80.

Using Kaiser's criterion to determine the number of factors (factors with eigenvalues greater than one were retained), six factors emerged from the analysis (n =150). Examining the unrotated analysis revealed that all 28 measures loaded onto the first component with a .35 or higher loading. The varimax rotation grouped the 28 measures into 6 components. Three of the components had five or more factor loadings of .6 or above. The fourth factor had 5 items that loaded at a .4 or above. The fifth factor consisted primarily of two measures: Desktop publishing in and out of class. Strangely, this particular activity had a .80 (in-class) and .85 (homework) loading onto this fifth component, with no crossloadings on any of the other five components. The sixth component consisted of a number of low positive and negative crossloadings of measures that were included in the previous four components and did not suggest a single component.

The four components suggested by the rotated analysis each fit clearly with specific types of activities: use of the computer as a tool in-class, use of the computer as a tool for homework, use of the computer as a tutor in-class, and use of the computer as a tutor for homework. Even though there were four identified components, all 28 of the items were related to the construct of "type of activity" as indicated in Table 4 by the Cronbach alpha statistic for all 28 items which was .92, indicating a very high degree of internal consistency/homogeneity for these items. Therefore, the responses to these 28 measures of activities were averaged and then transformed to a zero-to-four-point scale. This score was then averaged together with the score from the item measuring the respondents' perception of the types of activities they assigned most to create a single value for types of activities assigned.

The third aspect of computer integration, the teacher's disposition towards computers in teaching, was measured by three items. Table 5 presents the correlation matrix for the three items (n = 195). The correlations were all positive and of moderate strength (the average correlation = .70), supporting the idea that these items were not isolated dimensions. The lowest correlation was between the importance of computers in the respondents' teaching and how they feel about using computers in their teaching (r = .63), and the highest correlation was between how the respondents' feel about using computers in their teaching and how useful they feel computers are in language learning (r = .82).

Table 4

Index of types of computer activities assigned

Aspect	Items
Types of computer activities (ALPHA = .92) Min. no. rqrd = 12	9. Over the past 6 months to a year, how frequently have students used computers to complete the following activities in the target language? Word processing Desktop publishing Creation of multimedia presentations (e.g. PowerPoint) Collaborative writing / projects Games, simulations, puzzles, or exploratory programs A textbook supplemental CD Drill-and-Practice/Workbook-type drills Language tutorials: Integrated skills (e.g. integrated reading and writing with a focus on communication) Language tutorials: discrete skills (e.g. separate focus on reading, writing, …) Email, chat (instant messaging), or online discussion boards/blogs Research using the Internet Realia on the Internet (music videos, newscasts, etc.) Webquests Creation of a website

Table 5

Pearson Product-Moment correlations for the teacher's disposition towards computers in teaching index (n =195)

	Variable		
Variable	1	2	3
1. How important are computers in your teaching?	--		
2. Are computers useful in language learning?	.65**[a]	--	
3. How do you feel about using computers in language teaching?	.63**	.82**	--

[a]$p < .01$ **

The Cronbach alpha statistic for these three items was .87 indicating a high degree of internal consistency/homogeneity for these items. Table 6 lists the three items and their Cronbach alpha coefficients. To further explore the interrelations among the items an exploratory factor analysis was conducted. Using Kaiser's criterion to determine the number of factors (factors with eigenvalues greater than one were retained), only one factor emerged from the analysis (n =195). The single factor accounted for 80.04% of the total variance within the three items. The variable loadings for this factor ranged from .84 (importance of computers in one's teaching) to .92 (usefulness of computers in language learning). Given these findings, an index score for the respondents' disposition toward computer use in their teaching was calculated by averaging these three items together.

Table 6

Index of respondents' disposition toward computers in language teaching

Aspect	Items
Disposition toward computers in language teaching (ALPHA = .87) Min. no. rqrd = 2	7. In your opinion, how important are computer-based activities in your teaching? 12. How do you feel about using computers in your language teaching? 13. Regardless of how you feel about computers, are they useful in language learning?

The final two aspects of computer integration—the teacher's self-confidence in using computers and the nature of the teacher's interaction with other teachers regarding the instructional use of computers—were each measured by one item. To create a score for computer integration, these two items were averaged together with the three index scores created for the frequency of computer use, the types of learning activities for which the teacher uses the computer, and the teacher's disposition towards computers in teaching. The resultant scores were transformed to a four-point scale.

Table 7 presents the correlation matrix for the five indices (n = 192). The correlations were all positive and of moderate strength (the average correlation = .55), supporting the idea that these items were not isolated dimensions. The lowest correlation was between the perceived competency to use computers in one's teaching and frequency of use of computer activities in class (r = .39), and the highest correlation was between the degree of interaction with others on using computers in teaching and the perceived competency to use computers in one's teaching (r = .72). All correlations were significant at the .01 level or better.

Table 7

Pearson Product-Moment correlations among the five aspects of the computer integration index (*n* =192)

	Variable				
Variable	1	2	3	4	5
1. Frequency of use of computer activities	--				
2. Types of activities assigned	.49**[a]	--			
3. Disposition toward computer use in Language Learning	.53**	.62**	--		
4. Competence to use computers in teaching	.39**	.49**	.63**	--	
5. Interaction with others about computer use in teaching	.44**	.55**	.68**	.72**	--

[a]$p < .01$ **

The Cronbach alpha statistic for these five scores was .86 indicating a high degree of internal consistency/homogeneity for these items. Table 8 lists the five aspect scores for computer integration and their Cronbach alpha coefficient. To further explore the interrelations among the indices an exploratory factor analysis was conducted. Using Kaiser's criterion to determine the number of factors (factors with eigenvalues greater than one were retained), only one factor emerged from the analysis (*n* =192). The single factor accounted for 56.38% of the total variance within the five items. The variable loadings for this factor ranged from .59 (frequency of use of computers in one's teaching) to .85 (how important the respondents' felt about using computers in their teaching). Given these findings, the creation of the index score for computer integration was calculated by averaging these five scores together (requiring a minimum of 3 scores to be included in the cumulative score). This became the dependent variable for further analysis: *integration*.

Table 8

Index measuring the degree of computer integration

Aspect	Items
Computer integration	1. Frequency of use of computer activities
(ALPHA = .86)	2. Types of activities assigned
Min. no. rqrd = 3	3. Disposition toward computer use in language learning
	4. Competence to use computers in teaching
	5. Interaction with others about computer use in teaching

Computer Availability. Seven items on the instrument were designed to measure seven aspects of computer availability: whether or not a sufficient number of computers were available to use with an entire class, and if so, the location of the available computers; the ratio of computers to students; the advance request required to use computers with the entire class; the availability of a computer for the instructor's individual use; the quality of the computers available to students; and the types of computers usually used with the class (stationary desktops, laptops on a cart, laptops in a lab, student-brought laptops). This last item is a nominal categorical variable, thus it was not appropriate to use it in the creation of an index score. Instead, this variable's values were converted to binary dummy variables for more efficient data analysis.

In addition, the item inquiring as to the quality of the computers available for student use consisted of five separate measures. These measures represented different aspects of the quality of computers as related to language learning: computer speed, Internet connection speed, availability of language-learning software, multimedia capabilities of the computers (video and audio), and the multi-language capabilities of the computers (e.g., non-English fonts). Respondents rated each aspect on a four-point scale (poor, fair, good, excellent), plus the response option of "don't know". The responses to these five items were summed together to create a score for the quality of the available computers, and the scores were then transformed to a four-point scale.

To examine whether or not the aspects comprising the score accurately represented a construct of computer quality, the statistical relations among the items were examined using Pearson product-moment correlations, factor analysis, and the Cronbach alpha statistic.

Table 9 presents the correlation matrix for the five items (n = 181). The correlations were all positive and of moderate strength (the average correlation = .54), supporting the idea that these items were not isolated dimensions. The lowest correlation was between the Internet connection speed and the multi-language capabilities of the computers (r = .39), and the highest correlation was between the Internet connection speed and the speed of the computer (r = .84).

To further explore the interrelations among the items an exploratory factor analysis was conducted. Using Kaiser's criterion to determine the number of factors (factors with eigenvalues greater than one were retained), only one factor emerged from the analysis (n =181). The single factor accounted for 63.2% of the total variance within the five items. The variable loadings for this factor ranged from .60 (multi-language capabilities of the computers) to .85 (computer speed).

Further support for these findings was provided by the Cronbach alpha statistic. The Cronbach alpha statistic for these five items was .84 indicating a high degree of internal consistency/homogeneity for these items. Table 10 lists the survey items and their Cronbach alpha coefficient. Based on these statistical relations, the responses to these five aspects were summed and then transformed to a four-point scale to provide a score for the quality of the computers available to respondents.

The individual items on the instrument measuring the different aspects of the computers available to the respondents were all converted to four-point scales, then averaged together with the index score for the quality of the computers to create a single score for the computing infrastructure available to the respondents. This index score became one of the independent variables in additional analyses: *comp-availability*.

Table 9

Pearson Product-Moment correlations among the five measures of computer quality (n =181)

	Variable				
Variable	1	2	3	4	5
1. Computer speed	--				
2. Internet connection speed	.84**[a]	--			
3. Availability of language learning software	.49**	.46**	--		
4. Multimedia capability of computers	.60**	.55**	.57**	--	
5. Multi-language capability of computers	.42**	.39**	.46**	.59**	--

[a]$p < .01$ **

Table 10

Index measuring computer quality

Aspect	Items
Computer quality (ALPHA = .84) Min. no. rqrd = 3	21. How would you rate the computers available to your students? a. Computer Speed b. Internet Connection Speed c. Language-learning software availability d. Multimedia capabilities (video and audio) e. Multi-language capabilities (e.g., non-English fonts)

Technology Support Personnel. Six items on the survey instrument measured the presence and characteristics of support personnel. The first five items inquired as to whether or not 1) there is someone to provide technical support, 2) there is someone to provide instructional support, 3) more than one person provides support, 4) the support personnel are full-time employees, and 5) the support personnel have only support responsibilities. The responses to these five items were summed and transformed to a four point scale to create a score indicating the presence and nature of the support personnel. In addition to these five items, a sixth item asked respondents to evaluate the competence of their support personnel in terms of technology and pedagogy.

To measure the competence of the support personnel, two indices were created: one for technical support and one for instructional support. Each index was composed of five items to which participants responded on a scale of 1 (not very competent) to 6 (very competent). The Cronbach alpha statistics for these two scales were both .98, indicating a very high degree of internal consistency/homogeneity for the items in these scales. Table 11 lists the items and Cronbach alpha coefficients for these two indices.

The items were also examined using Pearson product-moment correlation. Table 12 presents the correlation matrix for the technical and pedagogical support competence indices (n = 197). The correlations for technical competence were all positive and of very high strength (the average correlation = .91), supporting the idea that these items were not isolated dimensions. The lowest correlation was between the operation of computers and customizing computers (r = .83), and the highest correlation was between repairing hardware problems and repairing software problems (r = .98).

Table 11

Indices measuring support personnel competencies

Aspect	Items
Technical competence (ALPHA = .98) Min. no. rqrd = 3	21a. Please rate your support person's technical competence in each of the following: a. Operating computers and software b. Maintaining computer availability c. Troubleshooting/repairing hardware problems d. Troubleshooting/solving software problems e. Customizing computers for instructors' needs

Aspect	Items
Pedagogical competence (ALPHA = .98) Min. no. rqrd = 3	21b. Please rate your support person's pedagogical competence in each of the following: a. Using computers in teaching b. Selecting software for language teaching c. Using the Internet in language teaching d. Creating/Using computer multimedia (audio/video) in teaching e. Helping you integrate computers into your teaching

The correlations for pedagogical competence were also all positive and of very high strength (the average correlation = .89), supporting the idea that these items were not isolated dimensions. The lowest correlation was between using the Internet in language teaching and helping teachers integrate computers into their teaching (r = .86), and the highest correlation was between creating/using computer multimedia in teaching and helping teachers integrate computers into their teaching (*r* = .92).

To further explore the interrelations among the items comprising these indices exploratory factor analyses were conducted. Using Kaiser's criterion to determine the number of factors (factors with eigenvalues greater than one were retained), only one factor emerged from the analysis (*n* =197) of the technical support scale. The single factor accounted for 92.2% of the total variance within the five items. The variable loadings for this factor ranged from .92 (competency customizing computers) to .98 (competency repairing hardware problems).

The analysis of the instructional support scale also revealed only one factor (*n* =197). The factor accounted for 91.4% of the total variance within the five items. The variable loadings for this factor ranged from .94 (competent to help the respondents integrate computers into their teaching) to .97 (competent using multimedia in teaching). Based on these statistical relations, the responses to the five aspects measuring the support provider's technical competence and the responses to the five aspects measuring the support provider's instructional competence were summed to create two index scores respectively. These scores were further transformed to a four-point scale.

An overall score for technology support was created from the three indices measuring the presence and nature of the support personnel, the support provider's technical competence, and the support provider's instructional competence and was then transformed to a four-point scale. This index score was retained to be used as one of the independent variables in further analyses: *staff*.

Table 12

Pearson product-moment correlations among the five measures of competence (n =197)

Technical Support Competence					
	Variable				
Variable	1	2	3	4	5
1. Operating computers and software	--				
2. Maintaining computer availability	.93**[a]	--			
3. Troubleshooting/repairing hardware	.94**	.92**	--		
4. Troubleshooting/solving software problems	.94**	.91**	.98**	--	
5. Customizing computers for instructors' needs	.83**	.85**	.86**	.88**	--

Instructional Support Competence					
	Variable				
Variable	6	7	8	9	10
6. Using computers in teaching	--				
7. Selecting software for language teaching	.91**[a]	--			
8. Using the Internet in language teaching	.87**	.91**	--		
9. Creating/Using computer multimedia (audio/video) in teaching	.92**	.91**	.90**	--	
10. Helping you integrate computers into your teaching	.87**	.87**	.86**	.92**	--

[a] $p < .01$ **

Personal One-on-One Assistance. Three items on the instrument measured the availability and speed of personal one-on-one assistance. The first item inquired as to the type of personal assistance needed most often: technical or instructional. This item measured a categorical nominal variable; thus, the variable's values were converted to a binary variable for data analysis The second item inquired as to who provides one-on-one technical and/or instructional assistance. Participants responded to a measure for each type of one-on-one assistance on a scale of 0 (nobody provides personal assistance) to 4 (support staff). The third item measured the speed at which the respondent usually receives personal assistance when it is requested, also presenting two scales for the measurement of both technical and instructional aspects. For this item, responses were on a scale of 0 (personal assistance is not available) to 4 (right away). Although the original research plan proposed creating an index score for each of the two aspects of personal assistance (technical and instructional) by adding together the relative responses to these second and third items, an examination of the statistical relations among the items using Pearson product-moment correlations and the Cronbach alpha statistic did not support this; thus, the two items were left as individual measures of aspects of personal, one-on-one assistance.

Professional Development Opportunities. Two items were created to measure the professional development opportunities available to respondents. The first measured the frequency and length of workshops available. The lengths measured included one-to-two hour, three-to-four hour, full-day, and multi-day workshops or classes. The frequency of each of these types of workshops was measured on a five-point scale: none, one-to-two a year, one-to-two each school term, one-to-two a month, and more than 2 a month.

Because longer workshops (full-day or multi-day) represent greater amounts of time available to respondents for professional development, the scale values were weighted before being used in statistical analysis. One-to-two hour workshops were not weighted, three-to-four hour workshop scores were multiplied by 1.33, full-day workshop scores were multiplied by 1.67, and multi-day workshops were multiplied by 2. The resultant values for each type of workshop by frequency offered can be seen in Table 13. To examine whether or not the items accurately comprised an index of frequency of professional development opportunities, the statistical relations among the items were examined using Pearson product-moment correlations, factor analysis, and the Cronbach alpha statistic.

Table 13

Ascending values for type of professional development workshop frequencies

	Values				
Type of Workshop	None	1 – 2 / year	1 – 2 / term	1 – 2 / mo	2+ / mo
1 – 2 hour	0	1	2	3	4
3 – 4 hour	0	1.33	2.66	3.99	5.32
Full-day	0	1.67	3.34	5.01	6.68
Multi-day	0	2	4	6	8

Table 14 presents the correlation matrix for the four items (n = 167). The correlations were all positive and strong (the average correlation = .57), supporting the idea that these items were not isolated dimensions. The lowest correlation was between one-to-two hour workshops and the multi-day workshops (r = .44), and the highest correlation was between one-to-two hour workshops and three-to-four hour workshops ($r = .69$). Further support for these findings was provided by the Cronbach alpha statistic. The Cronbach alpha statistic for these four items was .84 indicating a high degree of internal consistency/homogeneity for these items. Table 15 lists the items and the Cronbach alpha coefficient for these four items.

Table 14

Pearson Product-Moment correlations among the four measures of professional development frequencies according to type

	Variable			
Variable	1	2	3	4
1. 1-2 hour workshops	--			
2. 3-4 hour workshops	.69**[a]	--		
3. Full-day workshops	.54**	.64**	--	
4. Multi-day workshops	.44**	.54**	.57**	--

[a]$p < .01$ **

Table 15

Index measuring frequency of professional development opportunities according to type

Aspect	Items
Professional development opportunities: frequency according to type (ALPHA = .84) Min. no. rqrd = 2	30. How frequently have the following types of workshops or classes been available to you? a. 1- to 2-hour workshops / classes b. 3- to 4-hour workshops / classes c. Full-day workshops / classes d. Multi-day workshops / classes

To further explore the interrelations among the items comprising this index exploratory factor analysis was conducted. Using Kaiser's criterion to determine the number of factors (factors with eigenvalues greater than one were retained), only one factor emerged from the analysis (n =167) of the scale. The single factor accounted for 67.9% of the total variance within the four items. The variable loadings for this factor ranged from .77 (multi-day workshops) to .88 (3-to-4 hour workshops). Based on these statistical relations, the scores from these items were summed to create an index score for the frequency of professional development opportunities, and then this score was transformed to a zero-to-four point scale.

In addition, an index was created to measure the number of professional development workshops given on specific topics over a year. The items were measured using the following scale: don't know, zero, one to two, three to four, more than five. The Cronbach alpha for this index was .92, which is very good, and is listed in Table 16, along with the topics that define the index. The Pearson product-moment correlations for the items comprising the index were all positive, as displayed in Table 17. The average correlation was .52, and the lowest correlation was between hardware/software troubleshooting and online course management (r =.32). The highest was between productivity software and graphics / image-editing software (r = .82).

A factor analysis was conducted using Kaiser's criterion to determine the number of factors (factors with eigenvalues greater than one were retained). One factor emerged from the analysis (n =177). The first factor accounted for 57.4% of the total variance within the ten items, and the variable loadings for this factor ranged from .67 (hardware/software troubleshooting) to .85 (graphics/image-editing software).

Table 16

Index measuring professional development topics

Aspect	Items
Prof development topics (ALPHA = .91) Min. no. rqrd = 6	31a. Basic computer use 31b. Hardware / software troubleshooting 31c. Productivity software (e.g., word processors, spreadsheets) 31d. Graphics / image editing software 31e. Computer audio/video 31f. Teaching with language learning software 31g. Teaching with Internet resources 31h. Teaching students to use computers in language learning (creating websites, multimedia) 31i. Creating your own language-learning activities 31j. Online course management (WebCT, Blackboard, etc.)

A second component was identified in the initial analysis, and although none of the factor loadings were above .46, due to the number of cross-loadings, the rotated matrix was also examined. This revealed two strong components: one which could be labeled basic computer use, and the other labeled teaching with technology. The first and second components accounted for 37.3% and 32.2% of the variance, respectively. The variable loadings on the first factor ranged from .58 (online course management software) to .89 (productivity software: word processors, spreadsheets, etc.). The variable loadings on the second factor ranged from .75 (creating language learning activities) to .82 (teaching students to use computers in language learning: creating websites, multimedia, etc.).

Table 17

Pearson product-moment correlations among the various types of professional development workshops

	Variable									
Variable	1	2	3	4	5	6	7	8	9	10
1. Basic computer use	--									
2. Hardware/software troubleshooting	.53**[a]	--								
3. Productivity software	.68**	.54**	--							
4. Graphics/image editing software	.60**	.56**	.82**	--						
5. Computer audio/video	.58**	.61**	.69**	.76**	--					
6. Teach with LL software	.37**	.42**	.34**	.39**	.51**	--				
7. Teach with Internet resources	.40**	.40**	.44**	.47**	.52**	.58**	--			
8. Tch students use computers in LL	.37**	.37**	.36**	.47**	.46**	.58**	.60**	--		
9. Creating your own LL activities	.43**	.45**	.44**	.49**	.53**	.63**	.53**	.55**	--	
10. Basic computer use	.50**	.31**	.60**	.64**	.55**	.29**	.46**	.39**	.36**	--

[a]*p* < .01 **

Based on the indication that there were two aspects to this component, and that the second aspect is characteristic of the types of activities associated with higher levels of integration, the items comprising the second component were weighted by multiplying the scores by 1.5. The scores for each item were then summed to create an index score for the number of professional development workshops given on specific topics over the previous year and then this score was transformed to a zero-to-four point scale. The scores from this index were averaged together with the scores from the frequency of professional development opportunities index to create a single index score for professional development which was used in subsequent statistical analysis: *prodev*.

Incentives and Disincentives. One item on the instrument measured how frequently different incentives to use technology in the respondents' teaching were offered. This item measured nine different types of incentives possible. The responses were measured on a six-point scale ranging from rarely to frequently, with "NA: the incentive has never been offered" equal to zero. To account for the fact that one incentive offered frequently should have a more positive effect than several incentives offered only rarely, each response was used as an exponent to a base score of 1.5. Thus, a response of rarely would be evaluated as a 1.5 and a response of frequently would be evaluated as a 11.4.

To examine whether or not the items accurately comprised an index of incentives, the statistical relations among the items were examined using Pearson product-moment correlations, factor analysis, and the Cronbach alpha statistic. Table 18 presents the correlation matrix for the nine items (n = 183). The correlations were all positive (the average correlation = .25). The lowest correlation was between release time and preferential treatment (r = .07), and the highest correlation was between professional advancement and formal recognition. (r = .53). The Cronbach alpha statistic for these nine items was .75 indicating a moderate degree of internal consistency/homogeneity for these items. Table 19 lists these nine items and the Cronbach alpha coefficient.

Table 18

Pearson product-moment correlations among the various types of incentives to use technology in teaching

	Variable								
Variable	1	2	3	4	5	6	7	8	9
1. Financial stipends or pay increases	--								
2. Computer or laptop loan	.24**[a]	--							
3. Computer / Internet access at school	.14	.38**	--						
4. Internet access at home	.10	.16*	.47**	--					
5. Release time	.30**	.23**	.13	.28**	--				
6. Professional advancement	.29**	.21**	.19*	.25**	.31**	--			
7. Formal recognition	.38**	.15*	.15*	.16*	.35**	.53**	--		
8. Preferential treatment	.23**	.19*	.24**	.15*	.07	.27**	.34**	--	
9. Informal recognition	.25**	.23**	.18*	.16*	.19**	.38**	.49**	.39**	--

[a] $p < .01$ **

To further explore the interrelations among the items comprising this index exploratory factor analysis was conducted. Using Kaiser's criterion to determine the number of factors (factors with eigenvalues greater than one were retained), one factor accounted for 34.1% of the variance of the scale (n =183). The variable loadings for this factor ranged from .48 (Internet access at home) to .73 (formal recognition).

Although a second and third component were identified in the initial analysis, no clear common theme emerged by which they could be classified. In addition, their eigenvalues were just barely over one (1.2 and 1.0). Thus, these additional components were rejected. Based on these results, the scores for each measure were weighted and then summed to create an index score for incentives and then this score was transformed to a zero-to-four point scale to be used in later statistical analysis: *incentives*.

Table 19

Index measuring incentives to use technology in teaching

Aspect	Items
Incentives to use technology (ALPHA = .75) Min. no. rqrd = 6	32. How frequently are each of the following provided as incentives to motivate you to use computers more in your instruction? a. Financial stipends or pay increases b. Computer or laptop loan c. Computer / Internet access at school d. Internet access at home e. Release time, e.g. to experiment using computers f. Professional advancement g. Formal recognition, e.g. public recognition, awards h. Preferential treatment, e.g. first choice of classes or times i. Informal recognition, e.g. a pat on the back

An additional item on the instrument measured the degree to which different disincentives discouraged the respondents' use of technology in their teaching. This item measured eight different types of disincentives. The responses were measured on a six-point scale ranging from not much to very much. To examine whether or not the items accurately comprised an index of disincentives, the statistical relations among the items were examined using Pearson product-moment correlations, factor analysis, and the Cronbach alpha statistic.

Table 20 presents the correlation matrix for the eight items (*n* = 176). The correlations were all positive (the average correlation = .3). The lowest correlation was between extra preparation time required to use computers in teaching and unapproachable or intimidating technical support staff (*r* = .03), and the highest correlation was between lack of training in how to use the computer and lack of training in how to use computer activities in teaching (*r* = .73). The Cronbach alpha statistic for these eight items was .82 indicating a strong degree of internal consistency/homogeneity for these items. Table 21 lists these eight items and the Cronbach alpha coefficient. Based on these results, the scores were summed to create an index score for disincentives and then this score was transformed to a zero-to-four point scale to be used in later statistical analysis: *disincentives*.

Table 20

Pearson product-moment correlations among the various types of disincentives to use technology in teaching

	Variable							
Variable	1	2	3	4	5	6	7	8
1. Unavailable technology support personnel	--							
2. Unapproachable / intimidating technical personnel	.42*[a]	--						
3. Lack of training in how to use the computer	.39*	.37*	--					
4. Lack of training in how to use computer activities in teaching	.41*	.44**	.80**	--				
5. Extra preparation time it takes to use computers in teaching	.28	.14	.31	.44**	--			
6. Unreliable computers	.47**[b]	.40*	.37*	.28	.38*	--		
7. Inadequate number of computers	.47**	.26	.28	.12	.08	.71**	--	
8. Inadequate computers (e.g., too slow, not powerful enough)	.39*	.35*	.15	.04	.17	.70**	.82**	--

[a]$p < .05$ *, [b]$p < .01$**

Table 21

Index measuring disincentives to use technology in teaching

Aspect	Items
Incentives to use technology	34. To what degree do the following discourage you from using computers in your language teaching?
(ALPHA = .82)	a. Unavailable technology support personnel
Min. no. rqrd = 6	b. Unapproachable / intimidating technical personnel
	c. Lack of training in how to use the computer
	d. Lack of training in how to use computer activities in teaching
	e. Extra preparation time it takes to use computers in teaching
	f. Unreliable computers
	g. Inadequate number of computers
	h. Inadequate computers (e.g., too slow, not powerful enough)

Data Collection

The foreign language departments selected were initially contacted by means of email. The first email provided the following information:

1) an introduction and explanation of the purpose of the study

2) an explanation of the importance of the department's participation

3) an explanation of the incentive for participating in the study

4) a request that the information about the survey be disseminated to the foreign language instructors in the department, along with a request to complete the survey.

5) a clickable link for direct access to the survey and manual access instructions should the clickable link not function correctly.

6) instructions for requesting a paper version of the survey if a respondent preferred,

Seven days after the initial email, a second follow-up e-mail message was sent reminding the recipients of the importance of their participation in the survey, thanking those who had already responded, and requesting that those who had not responded do so. This second email contained the same provisions for accessing the survey online as well as the option of obtaining a paper-and-pencil version of the survey through the US postal service.

Each institution received in the instructions to access the survey a randomly generated login ID unique to the institution. The ID was randomly generated by the program sending the e-mails and could not be used to identify the institution, but rather enabled the researcher to identify all responses emanating from any given institution. If the clickable link was used to access the survey, the institution ID was encoded in the link and submitted to the survey website automatically when the link was clicked. The survey instructions clearly explained the function of the ID and cautioned the respondents against forwarding the survey access instructions to any friend or associate outside their institution. This was to ensure that those using the clickable link or the ID did indeed teach at the institution for which it was generated.

The survey items were presented on no more than one computer screen at a time in an effort to keep vertical scrolling to a minimum. At the top of each page was a graphic indication of the participant's progress through the survey. At the bottom of each page were clickable links for proceeding to the next page, for quitting the survey, and for returning to the previous page. In the process of completing the survey, the participant was required to click on the “next” link at the bottom of each page to progress through the items. If items on the page were left blank, the participant was alerted to this fact and asked to confirm that they did indeed wish to leave the items blank. An affirmative response forwarded the respondent to the next page. If at any time users needed to exit the survey before completing it, they were able to click on the exit link to leave the survey.

Upon completion of the survey, participants were advised that telephone interviews would be conducted to increase the depth of the data collection. If they were willing to be contacted by phone, they were asked to provide their name and a telephone number at which they may be contacted, along with the time frame during which they would be available. This information was collected independently and could not be connected to the survey responses to ensure participant anonymity

In addition, upon completion of the survey and submission of the last page, participants were given the opportunity to register for a drawing for one of seven thirty dollar money orders that were given to seven randomly selected, registered respondents at the end of the study period. The registration form was automatically generated upon successful completion of the survey, and was in no way be connected to the survey responses, thus ensuring anonymity of the respondents’ answers to the survey. To discourage multiple submissions in an attempt to win more than one prize, no more than one prize recipient was selected from each institution. This information was provided in the initial email message as well.

To voluntarily register for a chance to win one of the prizes, respondents were required to provide name, address, and email address. Each registration was checked for duplication and duplicate entries were rejected. A privacy statement was included to assure that respondents' personal information was kept entirely confidential.

Statistical Analyses

The software that collected the responses to the survey instrument encoded the data and prepared it for entry into statistical analysis software.

All of the research questions were concerned with the relationship between aspects of technology support and the extent of computer integration. Having obtained values for integration, computer availability, support personnel, personal technical assistance, personal instructional assistance, professional development opportunities, incentives, and disincentives, the research questions for this study were addressed.

Research Question 1

The first research question is: What is the relationship between the availability of computers and the extent to which computers are integrated into the curricula? To answer this question indices for *integration* and *comp-availability* were created as described in the previous section. Pearson product-moment correlations were calculated between *integration* and *comp-availability*. In addition, correlations between each variable that comprise *comp-availability* and *integration* will be calculated and a correlation matrix generated to examine if any particular aspect of *comp-availability* shows a stronger correlation with *integration* than any other.

Research Question 2

The second research question is: What is the relationship between the nature of the technology support staff and the extent to which computers are integrated into the curricula? To answer this question an index for *staff* was created and Pearson product-moment correlations were calculated between *integration* and *staff*. In addition, correlations between each variable that comprise *staff* and *integration* were calculated to examine if any particular aspect of *staff* showed a stronger correlation with *integration* than any other.

Research Question 3

The third research question is: What is the relationship between the frequency and type of professional development opportunities and the extent of integration?
To examine this question, an index score for *prodev* was calculated as described in the previous section and Pearson product-moment correlations were calculated between *integration* and *prodev*. In addition, to examine the relationship between professional development workshops and *integration*, correlations between each aspect of professional development and *integration* were calculated and a correlation matrix generated.

Research Question 4

The fourth research question is: What is the relationship between the availability of one-on-one guidance and the extent of integration? One item measured the type of assistance most often requested, *patype*. In addition, two indices were planned to represent the provision of one-on-one personal assistance: one for technical personal assistance, and one for instructional personal assistance; however, statistical analysis did not support their creation. Therefore, the items on the survey were used as four measures of one-on-one assistance: speed of provision of technical assistance (*paspeedT*), speed of provision of instructional assistance (*paspeedI*), provider of technical assistance (*paprovideT*), and provider of instructional assistance (*paprovideI*).

The range, mean, standard deviation, skew, and kurtosis were calculated for these four variables to ensure that the scores were normally distributed, and Pearson product-moment correlations were calculated between *integration* and each of the four variables.

Research Question 5

The fifth research question is: What is the relationship between the provision of professional incentives and the extent of integration? The provision of professional incentives was measured by one item which contained nine different types of incentives. To account for the fact that one incentive offered frequently should have a more positive effect than several incentives offered only rarely, each response was used as an exponent to a base score of 1.5 in the calculation of the scale's scores. The scores for each sub-item were summed for an overall *incentives* score. The range, mean, standard deviation, skew, and kurtosis were calculated to ensure that the score was normally distributed.

Pearson product-moment correlations were calculated between *integration* and the *incentives*. In addition, correlations between each variable that comprised *incentives* and integration was calculated and a correlation matrix generated to examine if any particular *incentive* showed a stronger correlation with *integration* than any other.

Related to the question concerning incentives and integration is the question of whether or not there were any disincentives to integration. To analyze this, an item was included on the survey that inquired as to what disincentives respondent's may have experienced that limited their integration of computer technologies into their teaching. The item measured 8 different disincentives. The responses to these were summed for an overall score for disincentives. The range, mean, standard deviation, skew, and kurtosis were calculated to ensure that the score was normally distributed.

Pearson product-moment correlations were calculated between *integration* and *disincentives*. In addition, correlations between each variable that comprised *disincentives* and *integration* was calculated and a correlation matrix generated to examine if any particular *disincentive* showed a stronger correlation with *integration* than any other.

Research Question 6

The sixth research question is: What are the relationships between the aspects of technology support and the degree of computer integration? To investigate this question, a multiple regression analysis was conducted using *integration* as the dependent variable and nine variables (*comp-availability, staff, prodev, paspeedT, paspeedI, paprovideT, paprovideI, incentives,* and *disincentives*) as predictor variables. R^2 was examined to determine how the set of nine predictors explain integration. The regression coefficient (b) and the standardized regression coefficient (Beta) were used to examine how each independent variable relates to the dependent variable.

Research Question 7

The seventh research question is: For what types of activities do foreign language instructors use computing technologies the most in their instruction? To explore this question, the researcher examined the responses to the item on the survey that measured how often fourteen different types of computer activities were used for both in-class learning and homework (resulting in 28 separate measures). This particular survey item was referenced previously as one of the aspects which comprised the construct of integration. The specific activities measured are listed in Table 4 above. The reported values for each type of activity were summed together across all respondents, then an average was calculated for that particular activity using the number of valid (non-zero) responses. This resulted in an average score indicating how frequently each activity type was used by all respondents as a group.

Research Question 8

The eighth research question is: How do respondents' attitudes and beliefs about the use of computing technologies in their instruction correlate with their actual usage? This question sought to determine how strongly the respondents' beliefs about the value of technology in FL teaching coincided with their actual practice. To investigate this question, a correlation was calculated between two index scores that were originally created to measure aspects of computer integration: the index score for the respondents' disposition toward computer use in their teaching (their belief), and the respondents' score for the frequency of use of computers in their teaching (their practice).

CHAPTER IV:

RESULTS

The software that collected the responses to the survey instrument encoded the data and prepared it for entry into statistical analysis software. In addition to the collection of data for the construction of the variables representing computer integration and the factors affecting the level of integration, the survey also collected data that afford a picture of the typical respondent in the study.

Respondent Demographics

The values obtained for items 1 (state in which the school resides), 8 (the foreign language taught most by the respondent), 9 (the number of hours of teaching each week), 29 (age), 30 (years teaching), and 31 (first or native language) were recoded for fewer values based on the distributions of the responses.

Of the institutions responding, more than two-thirds (146 or 71.9%) of them were public universities, and almost two-thirds (129 or 63.5%) had 10,000 or more students. Almost all (191 or 94.1%) of the institutions required foreign language study by students who were not language majors.

The individual respondents were made up of 128 (63.1%) women and 73 (36%) men, and over half (114 or 56.2%) of the respondents had been teaching for 11 or more years. Adding to this the 43 (21.2%) individuals who had been teaching foreign languages for 6 to 10 years results in a total of 157 (77.4%) respondents who had been teaching foreign languages for more than five years. More than half of the respondents had Ph.Ds (122 or 60.1%), and 69 of them (34.0%) had Master's degrees. Of the Ph.D.'s, 87 (71.3%) had majored in the language or literature they primarily taught, three (2.5%) had majored in languages other than what they taught, 10 (8.2%) had majored in linguistics, 13 (10.7%) had majored in Second Language Acquisition, Foreign Language Education, or Applied Linguistics, and nine (7.4%) had majored in other fields. Of the Master's degree majors, 29 (42.6%) were in the language or literature they primarily taught, seven (10.3%) were in languages other than what they taught, four (5.9%) were in linguistics, 18 (26.5%) were in Second Language Acquisition, Foreign Language Education, or Applied Linguistics, and 10 (14.7%) were in other fields. Interestingly, although the highest number (116 or 61.1%) of majors among the advanced degrees was in the category of the language primarily taught, the second highest number of majors among advanced degrees was in the category of SLA, Applied Linguistics, FLE, or Linguistics (31 or 16.3%).

Finally, 100 (49.3%) of the respondents, almost half, were full-time, tenure-track faculty members, 39 (19.2%) were full-time, non-tenure-track faculty, and 61 (30.1%) were graduate teaching assistants or part-time faculty members. The largest age group represented by the respondents was the 41 to 50 year-old group (59 or 29.1%). Combined with the 31 to 40 and 51 to 60 year-olds, these formed the majority of respondents (168 or 79%). The 21 to 30 year-olds represented 11.8% (24) of the respondents, and 18 (8.9%) of the respondents were 61 or over. Thus, the picture that emerges of the typical respondent is of a full-time, as likely tenure-tracked as not, professional teacher with an advanced degree in the language he/she teaches and 5 or more years of experience teaching.

Research Questions

All of the research questions are concerned with the relationship between aspects of technology support and the extent of computer integration. The dependent variable for this study is the degree of computer integration: *integration.* The Mean for this variable was 2.2 with a SD of .77 (N = 197). The distribution was negatively skewed (-.36) and moderately kurtotic (-.75). The descriptive statistics for *integration* as well as all of the primary variables in this study are presented in Table 22.

Research Question 1

What is the relationship between the availability of computers and the extent to which computers are integrated into the curricula?

The distribution of *computers* was acceptably negatively skewed (-.31) and only slightly kurtotic (.11). To determine whether or not a relationship exists between computer *integration* and *computers*, Pearson's Product Moment Correlation was used. The results obtained indicated a significant but moderate relationship between the two variables; r = .331 ($p < .01$).

To explore these relationships, correlations between each of the aspects comprising the construct of *computers* and *integration* was examined. Spearman's rho was used due to the non-normality of some of the variables The correlations (Table 23) indicate that only two aspects of *computers* are significant: the location of a sufficient number of computers for use with a whole class (*cnum_location*) and the quality of the computers (*c_qlty*).

Table 22

Descriptive statistics for the major variables in the study

	Variable				
Variable	*n*	*M*	*SD*	Skew	Kurtosis
integration	197	2.20	.77	-.36	-.75
computers	172	2.30	.63	-.31	.11
staff	152	2.29	.71	-.69	.38
prodev	197	1.22	.77	.68	.74
paspeedT	196	2.70	1.10	-.54	-.28
paspeedI	179	1.91	1.33	-.13	-1.07
paprovideT	193	4.65	1.0	-2.87	7.07
paprovideI	180	3.55	1.60	-.81	-.99
incentives	195	1.27	.82	.68	-.03
disincentives	196	1.37	.75	.80	.27

Note. integration = computer integration; computers = the availability of computing infrastructure; staff = the characteristics of the technology support staff; prodev = professional development opportunities; paspeedT & paspeedI = the speed at which personal technical or instructional assistance is provided; paprovideT & paprovideI = the person who provides technical and instructional support; incentives = incentives provided to encourage computer integration; disincentives = factors the respondents encounter that discourage computer integration.

Of these two, *cnum_location* has a low correlation with integration (r = .24). The correlation of *c_qlty* with integration is moderate (r = 36). None of the other variables comprising *computers* showed a significant correlation with *integration*.

The categorical responses to the item on the survey instrument measuring types of computers used by students (laptops brought by students, laptops on a cart that can be moved to where they are needed, laptops in a lab, and stationary desktops), had been recoded into dichotomous variables. Analysis revealed that none of these different types had a significant correlation with *integration*.

Table 23

Spearman's Correlations between aspects of computers and integration

Variable	Variable integration
integration	--
cnum_location	.24**[a]
cratio_to_student	.06
cadvnc_rqst_rqrd	.02
c_qlty	.36**
cavail_for_psnl_use	.14

Note. integration = computer integration; cnum_location = location of sufficient number of computers to use with class; cratio_to_student = the ratio of computers to students; cadvnc_rqst_rqrd = the length of any advance request time required to reserve the computers; c_qlty = the index score for the quality of the computers available for use; cavail_for_psnl_use = the availability of a computer for the respondents' personal use.
[a] $p < .01$ **

Research Question 2

What is the relationship between the nature of the technology support staff and the extent to which computers are integrated into the curricula? Five items on the survey instrument inquired as to the nature of the technology support staff in terms of 1) the presence of technical support personnel, 2) the presence of instructional support personnel, 3) whether there was more than one person to provide support, 4) whether the support staff were full or part-time, and 5) whether the support staff had responsibilities in addition to technology support. These five measures were summed together to give an overall score for the type of technology support available. A higher score on this scale indicates the presence of more than one technology support person, the availability of both technical and instructional support, full-time status of the technology support personnel, and the ability to focus solely on technology support (no additional job responsibilities). This score was combined with two other scores: one indicating the technical support competency of the support personnel, and one indicating the instructional support competency of the support personnel. The three scores were added together, and the resultant sum transformed to a 0 to 4 point scale to create the *staff* variable. The descriptive statistics for this variable can be found in Table 22.

Pearson's Product Moment Correlation was used to explore any relationship that might exist between *staff* and *integration*. The results obtained indicate a significant but small relationship between the two variables ($r = .251$; $n = 152$; $p < .01$).

To ascertain whether any of the elements of *staff* had a significant relationship with *integration*, a correlation matrix was generated and examined using Spearman's rho. The results presented in Table 24 indicate that four measures were significant: competent operating computers (r=.22; $p < .05$), competent to use computers in teaching ($r = .19$; $p < .05$), competent to select language learning software ($r = .24$; $p < .05$), and competent to use the Internet in teaching ($r = .21$; $p < .05$).

Table 24

Spearman's Correlations between aspects of staff and integration (n = 112)

Variable	Variable *integration*
Integration	--
Technical support available	.03
Instructional support available	.13
One person provides both areas of support	.07
Support personnel full-time	.10
Personnel have only support duties	.09
Competent operating computers	.22*[b]
Competent maintaining computers	.09
Competent troubleshooting hardware	.06
Competent troubleshooting software	.05
Able to customize computers for instructors	.07
Competent using computers in teaching	.19*
Competent choosing software for ll	.24*
Competent using the Internet in teaching	.21*
Competent using multimedia in teaching	.18
Competent helping teachers integrate computers into teaching	.16

[a] $p < .01$ **, [b] $p < .05$

Research Question 3

What is the relationship between the frequency and type of professional development opportunities and the extent of integration?

An index was created from the items on the survey instrument measuring professional development opportunities and their affect on the level of computer integration in the respondents' teaching. The scores for this index were coded into the *prodev* variable. The Mean for *prodev* was 1.2 with a SD of .77 ($N = 197$). The distribution was positively skewed (.68) and kurtotic (.74); however, it was still usable as a normally distributed variable.

To determine whether or not a relationship exists between computer *integration* and *prodev*, Pearson's Product Moment correlation was. The results obtained indicated a significant but moderate relationship between the two variables ($r = .40$; $p < .01$). To explore these relationships further, the correlations between the items on the survey instrument which constituted the *prodev* score and *integration* were examined. The prodev score was compiled from two sets of measures: frequency of workshops by length and frequency of workshops by topic. Spearman's rho was used to examine these correlations due to the non-normality of some of the variables that constituted the index for *prodev*.

The correlations for the frequency of workshops by length with *integration* are presented in Table 25. All of the correlations are significant, with the correlation between multi-day workshops and integration being the highest and the only one at the moderate level. Although statistically significant, the other correlations are small.

The correlations for the frequency of workshops by topic with *integration* are presented in Table 26. All of the correlations are significant ($p < .01$) except for the correlation between hardware/software troubleshooting workshops and integration, which is significant at only the level of $p < .05$. The correlation between workshops on creating one's own language learning activities and integration is the highest ($r = .38$), but others are near this level with six of the ten workshop topics correlating with integration at a moderate level.

Table 25

Spearman's Correlations between the frequency of workshops by length and integration (n = 167)

Variable	Variable *integration*
Integration	--
1-2 hour workshops	.26**[a]
3-4 hour workshops	.26**
1 day workshops	.23**
Multi-day workshops	.31**

[a]*p* < .01 **, [b]p < .05*

Table 26

Spearman's Correlations between the frequency of workshops by topic and integration (n = 177)

Variable	Variable *integration*
integration	--
basic computer use	.25**[a]
hardware / software troubleshooting	.19*[b]
productivity software (word processors)	.29**
graphics / image editing software	.34**
computer audio/video	.32**
teach with language learning software	.31**
teach with internet resources	.37**
teach students to use computers in ll (creating websites, multimedia)	.35**
creating own language-learning activities	.38**
online course management (webct,etc.)	.26**

[a] $p < .01$ **, [b] $p < .05$*

Research Question 4

What is the relationship between the availability of one-on-one assistance and the extent of integration?

Five items on the survey instrument measured one-on-one assistance. There were five items on the survey instrument measuring one-on-one personal assistance: the type of assistance most often requested (*patype*), who the provider of technical assistance is (*paprovideT*), who the provider of instructional assistance is (*paprovideI*), the speed of provision of technical assistance (*paspeedT*), and the speed of provision of instructional assistance (*paspeedI*). Three of these measures indicated a small, albeit significant, correlation with *integration*: *paprovideT* (r = .18; $p < .05$), *paprovideI* (r = .19; $p < .05$), and *paspeedI* (r = .26; $p < .01$).

Table 27

Spearman's Correlations between the one-on-one assistance variables and integration (n = 168)

Variable	Variable *integration*
integration	--
patype	.14
paprovideT	.18*[b]
paprovideI	.19*
paspeedT	.11
paspeedI	.26**[a]

[a] *p* < .01 **, [b] p < .05*

To investigate whether or not there is a relationship between who provides the personal one-on-one assistance and the speed at which it is delivered, a correlation matrix was generated between these four variables: *paprovideT, paprovideI, paspeedT, paspeedI*. The results are displayed in Table 28. All but one of the correlations was significant, with the strongest correlation being between who the provider of instructional one-on-one assistance is (*paprovideI)* and the speed at which instructional one-on-one assistance is provided (*paspeedI)* (r = .54; $p < .01$).

Table 28

Spearman's Correlations between the one-on-one assistance variables (n = 171)

	Variable			
Variable	1	2	3	4
1. paprovideT	--			
2. paprovideI	.19^{*b}	--		
3. paspeedT	.24^{**a}	.15	--	
4. paspeedI	.18*	.54**	.45**	--

$^{a}p < .01$ **, $^{b}p < .05$*

Research Question 5

What is the relationship between the provision of professional incentives and the extent of integration?

A Pearson's Product Moment correlation was generated for *incentives* and *integration*. The results indicate a small but significant correlation between *incentives* and *integration* (r = .28; p < .01; n = 194). To explore the relationships between *incentives* and *integration* further, Spearman's rho correlations were generated between *integration* and each of the individual aspects of *incentives.* The results are presented in Table 29.

Several of the incentives exhibited significant but weak correlations with *integration*. The strongest correlation was between *integration* and the provision of professional advancement (r = .27; p < .01). Almost as strong was the correlation between *integration* and formal recognition (r = .27; p < .01). Other significant correlations with *integration* included informal recognition (r = .25; p < .01), preferential treatment (r = .23; p < .01), release time (r = .23; p < .01), Internet access at home (r = .21; p < .01), and computer/Internet access at school (r = .21; p < .05).

Table 29

Spearman's Correlations Between Various Incentives and integration (n = 150)

Variable	Variable *integration*
integration	--
financial or pay benefits	.12
computer or laptop loan	.09
computer / internet access at school	.21*[b]
internet access at home	.21**[a]
release time e.g. to try using computers	.23**
professional advancement	.27**
formal recognition	.27**
preferential treatment	.23**
informal recognition	.25**

[a]p < .01**, [b]p < .05*

The impact of disincentives on computer integration was also examined. The correlation between *disincentives* and *integration* was negative and non-significant (r = -.03; n = 194). The correlation between each of the different disincentives and integration were examined using Spearman's rho. As can be seen in Table 30, only five disincentives have a significant correlation with integration . The most significant correlation was between integration and a lack of training in how to use computer activities in teaching (r = -.26; p < .01). Other significant, but weak, correlations included those between integration and the extra preparation time needed to use computers in teaching (*r* = .17; $p < .05$), unapproachable / intimidating technical personnel (*r* = .15; $p < .05$), insufficient number of computers (*r* = .18; $p < .05$), and unreliable computers (*r* = .15; $p < .05$).

Table 30

Spearman's Correlations between various disincentives and integration (n = 176)

Variable	Variable integration
integration	--
unavailable technology support personnel	.13
unapproachable technical personnel	.15*[b]
lack of training in how to use the computer	-.09
lack of training how to use computer in teaching	-.26**[a]
extra preparation time needed to use computers in teaching	-.17*
unreliable computers	.15*
insufficient number of computers	.08
inadequate computers	.18*

[a] $p < .01$ **, [b] $p < .05$*

Research Question 6

What are the relationships between the aspects of technology support and the degree of computer integration?

To respond to this question, multiple regression analysis was conducted using *integration* as the dependent variable and seven variables (*computers, staff, prodev, paprovideT, paprovideI, paspeedT, paspeedI, incentives,* and *disincentives*) as predictor variables. Table 31 presents the means, standard deviations, and intercorrelations for *integration* and technology support predictor variables. The model for this multiple regression analysis was:

integration = β0+ β1 *computers* + β2 *staff* + β3 *prodev* + β4 *paprovideT* + β5 *paprovideI* + β6 *paspeedT* + β7 *paspeedT* + β8 *paspeedI* + β9 *incentives* + β10 *disincentives.*

For this model, R^2 = .29, adjusted R^2 = .23, and F = 5.06 (n = 123, p < .000). As Table 32 indicates, three predictor variables are significant: professional development (p < .01), the person providing technical one-on-one assistance (p < .05), and the provision of incentives for integrating computers into one's teaching (p < .05).

Research Question 7

For what types of activities do foreign language instructors use computing technologies the most in their instruction?

The results of the analysis for this question indicate that respondents use computer activities for homework more frequently than they do in class, and the most often assigned activity is word processing: 4.62 on a 6-point scale. Further, word processing was assigned as homework 2.54 times more often than it was used in class.

Rounding out the top five activities for which respondents assigned computers, in order of descending frequency of use, are: using the Internet as a resource for homework (4.25), using the textbook CD for homework (3.75), using drill and practice activities for homework (3.62), and using the Internet for research for homework (3.59).

The top five in-class activities using computers were: using the computer for Internet research (2.54), using the textbook CD (2.39), using an integrated-skills language tutorial program (2.38), using the Internet as an authentic materials resource (2.18), and using a discreet-skills language tutorial program (2.15). Using the computer for word processing in class was at position 22 (out of 28 places)..

Research Question 8

How do respondents' attitudes and beliefs about the use of computing technologies in their instruction correlate with their actual usage?

This question was examined by using two index scores that were a part of the larger construct of integration: the score for respondents' disposition toward computer use in their teaching and the score for respondents' reported frequency of use of computers in their teaching. A correlation was calculated for these two sets of scores and found to be strong and highly significant ($r = .54$, $p < .000$), indicating that, in terms of computer technology use in their teaching, the respondents' practice strongly coincides with what they believe about technology's efficacy in FL teaching.

In the next chapter, the results of these analyses will be discussed to ascertain which of the aspects of technology support are the best indicators of higher degrees of technology integration in the respondents' teaching. Explanations and implications of the findings will be offered as well.

Table 31

Means, Standard Deviations, and Intercorrelations for Computer Integration and Technology Support Variables

Variable	*M*	*SD*	*n*	1	2	3	4	5	6	7	8	9	10
1. integration	2.31	.72	123	--									
2. computers	2.36	.59	123	.27**	--								
3. staff	2.90	.86	123	.18*	.08	--							
4. prodev	1.33	.80	123	.40**	.20*	.14	--						
5. paprovidet	4.68	.94	123	.22*	.17	.04	.07	--					
6. paprovidei	3.62	1.58	123	.18	.10	.25**	.17	.29**	--				
7. paspeedt	2.84	1.03	123	.12	.14	.38**	.09	.36**	.23*	--			
8. paspeedi	2.30	1.34	123	.28**	.17	.55**	.22*	.19*	.57**	.51**	--		
9. incentives	1.29	.83	123	.37**	.21*	.27**	.42**	.11	.20*	.17	.25**	--	
10. disincentives	1.33	.72	123	.04	-.08	-.15	.09	-.17	.25**	.21*	.19*	.07	--

Table 32

Regression Analysis Summary for Technology Support Variables Predicting Computer Integration

Variable	*B*	*SE B*	β	*t*	*p*
(Constant)	.67	.44		1.51	.13
computers	.18	.10	.14	1.73	.09
staff	.03	.08	.03	.34	.74
prodev	.23	.08	.25	2.82	.01
paprovideT	.14	.07	.18	2.00	.05
paprovideI	-.02	.05	-.05	-.44	.66
paspeedT	-.07	.07	-.10	-1.03	.31
paspeedI	.10	.07	.19	1.56	.12
incentives	.16	.08	.18	1.97	.05
disincentives	.06	.09	.06	.68	.50

CHAPTER V:

DISCUSSION

This study began with the consideration of a fictional, but realistic scenario in which the problem of teachers not fully utilizing computing technologies in their teaching is addressed by the upgrade or addition of new computing hardware. Vast resources have been spent on computing technologies for equipping computer labs and technology-equipped classrooms, yet a 2009 article in *The Chronicle* (Young, 2009) reports that a survey of British college students found that 59 percent of them rated half of their lectures as boring, and cited the use of PowerPoint, as well as other types of computer activities in the classroom and in computer labs, as one of the chief reasons. The article continues by suggesting that the problem is not with the technology, but rather with the ways in which it is used. The article concludes with a suggestion and plan for a return to teaching without any computing technology being used at all.

As indicated earlier in this work, research has shown that the presence of computers alone does not lead to a greater use of technology in teaching, but rather greater integration of computing technologies in teaching results when there is a presence of sufficient technology resources combined with instruction in how to use them in teaching (Glennan & Melmed, 1996; NCES, 2000; OTA, 1995; Report to the President, 1997; Ronnkvist *et al.*, 2000; Sandholtz *et al.,* 1997). Since most of this research has been conducted in K-12 educational contexts, this present study sought to contribute to knowledge in this area by exploring whether or not the same conditions for integration of computing technologies applied to the context of post-secondary second language learning as well.

Using the levels of increasing integration identified by Sandholtz *et al.* (1997), this study focused on identifying the degree to which instructors in college-level foreign language courses integrated computer-based activities into their teaching, as well as whether or not any of the aspects of technology support that were identified by Ronnkvist *et al.*, (2000) were better predictors of said teachers' degrees of integration. The results presented in the previous chapter suggest that some aspects of technology support do indeed correlate more highly with higher degrees of integration than others. These results will be analyzed in terms of the research questions which guided this study.

Findings and Interpretation

Research Question 1

What is the relationship between the availability of computers and the extent to which computers are integrated into the curricula?

The data analysis of the variables related to this question indicated that there is an overall moderate relationship between the computers available to instructors and their degree of computer integration. This result was expected, since intuitively one would expect that a higher degree of quality and number of computers would have some correlation with their degree of integration into teaching. Computers of a poor, or low quality, as well as too few computers, are of limited usefulness for instructors. As Ronnkvist *et al.* (2000) discovered, a quality computing infrastructure, including Internet access, must be in place and available for greater computer use in teaching to occur.

Further analyses of the individual components constituting the index score for computers revealed two out of the five aspects specifically had significant relationships with integration. Interestingly, one of the weakest correlations with integration was the amount of advance request time required to use computers with one's class. The findings did not suggest this to have much, if any, relationship with integration.

The first aspect, the location of a sufficient number of computers to use with an entire class, had a significant but small relationship with integration. This corresponds well with what others have indicated (CEO Forum, 1999; Sandholtz *et al.*, 1997). At the lower levels of integration, students often use computers in a lab at specific times each week, guided perhaps by a lab teacher. As the level of integration increases, so does the need for the presence of a sufficient number of computers in a classroom available for use at any and all times, since greater integration corresponds to greater use of the computer as a tool rather than a tutor, and to its use in more project-based learning (Dias, 1999; Sandholtz *et al.*, 1997). The availability of a sufficient number of computers increases the opportunities for a greater number of students to utilize these resources while at the same time also increasing the convenience of implementing technology-based lessons for teachers.

Furthermore, as Ronnkvist *et al.* (2000) found, there is a second important aspect to the computing infrastructure: the quality of the computers. Computers need to have relevant software, along with Internet access, in order to be usefully integrated into teaching. Likewise, this present study found that the quality of the computers available for use displayed a strong relationship with integration. This would seem to indicate that computers which perform poorly are less likely to be used. As this author has often found in his own teaching, computers that do not perform well lead to frustration with and an abandonment of the technology for a return to safer more familiar methods of instruction.

The correlation between the availability of a sufficient number of computers in a convenient location was significant, and the relationship was small. It may be that the need to have a sufficient number of computers to use with an entire class may correspond more with less integrative modes of computer use: using the computer as a tutor and requiring students to individually complete modules of learning at their own pace. On the other hand, when computers are used as tools in the classroom, as one of the resources used to complete a project-based activity, then the need of one computer per student may not be as great, since not all students will need to be working at a computer continuously. Nonetheless, it would still be quite important for the computers that are available to work well and provide the resources the students will need to complete their language-learning tasks. Thus, the presence of a stronger correlation between quality of computers and integration.

Research Question 2

What is the relationship between the nature of the technology support staff and the extent to which computers are integrated into the curricula?

As has been found by others (Garner & Gillingham, 1996; Ginsberg & McCormick, 1998; Ronnkvist, *et al.*, 2000; Sandholtz *et al.,* 1997), the existence of even a high quality computing infrastructure does not ensure the use of computing technologies in instruction. Ronnkvist *et al.* (2000) found that teachers need high quality technology support, including specific support personnel, to be able to use the technology in their teaching. Whether or not these personnel are full-time or part-time or have duties in addition to support does not seem to be as important as is their availability to the teachers and the type of support that they provide (Ronnkvist *et al.*, 2000).

The analysis of the data for the current study also indicated that the presence, nature, and quality of the support personnel had a small, but significant correlation with integration. As also found by Ronnkvist *et al.* (2000), the relationships between the aspects of the nature of the support staff (whether they are full or part time, have additional responsibilities or not, whether there is one or more support staff member, even whether or not both technical and instructional support are available) and integration were all small and non-significant. It appears that these characteristics of the staff are not as important as what the staff actually provides in the way of support.

One finding of interest is the correlation between whether or not the support personnel have responsibilities only in the area of support, or responsibilities that also include teaching or other administrative work. This relationship was barely existent. One possible explanation for this is that those support personnel who are not involved in other duties alongside the teachers they support may see themselves as less engaged with those teachers and less aware of the difficulties they face when integrating technology into their teaching. Ronnkvist *et al.* (2000) found that those with additional duties were usually (45% of their respondents) involved in teaching in addition to technology support; thus, they were more engaged in the process of actually integrating technology into teaching than were those technology support personnel who had only support responsibilities.

In this current study, there were three aspects of staff that had the strongest relationships with integration: competence to choose software for language learning, competence using the Internet in teaching, and competence to help teachers integrate computers into their teaching. All three of these relationships are manifestations of the type of support that helps teachers integrate and use computers in their teaching. These results substantiate what has been found to be most needed in other studies of computer integration into teaching: instructional support in how to use the computers in teaching is essential if the technology resources are going to be utilized (Glennan & Melmed, 1996; NCES*,* 2000; OTA, 1995; Report to the President, 1997; Ronnkvist *et al.*, 2000; Sandholtz *et al.,* 1997). This is further indicated by the finding in the current study that, though not significant, the correlation between integration and the availability of instructional support is four times as high as the correlation between integration and the availability of technical support.

The findings of the current study seem to echo the findings of others, specifically Ronnkvist *et al.,* (2000). It seems to be insignificant whether or not the staff is full-time or part-time, consists of one or more individuals, or is burdened with duties in addition to technology support. What is most important is that, whatever support staff exists, they provide support and training in how to use computers in teaching. This further reflects what has been called for by the 1997 Report to the President which called for assistance with the "deeper pedagogic challenges" (Section 5.2) of integrating technology into teaching, and the CEO Forum STAR report (1999) which called for greater attention to teachers' use of technology to improve their students' performance. Thus, teachers of foreign languages at the college level need the greatest support in the area of how to use the technology they already have available to them instructionally.

Research Question 3

What is the relationship between the frequency and type of professional development opportunities and the extent of integration?

The correlation between this element of support, professional development, and integration was the strongest of all the elements of technology support. Time and again, training in how to integrate technology into teaching has been identified as one of the more important requirements for the successful integration of computers into instruction, and these results substantiate this need (Glennan & Melmed, 1996; Report to the President, 1997; Sandholtz *et al.*, 1997). Glennan and Melmed (1996) specifically called for professional development opportunities that were more than one-shot generic sessions at a system-wide level. They proposed the development of ongoing training targeted at the teachers' specific needs; training that would provide teachers with the requisite knowledge and skills for creating contexts in which the computer would be used efficiently and effectively for learning. One finding from the current study which would seem to corroborate this need is the correlation between higher levels of integration and multi-day workshop availability. Those respondent's who received the greatest number of multi-day workshops within a year were also more integrative in their use of computers in their instruction.

Furthermore, many have noticed that greater computer integration occurs as teachers move to more project-based approaches in which the computer is used as a tool rather than as a tutor (Becker, 2001; CEO Forum, 1999; Glennan & Melmed, 1996;

Sandholtz *et al.*, 1997). This fundamental change does not occur overnight, but rather necessitates time and a reorientation of one's educational philosophy and approach. This requires guidance as to how to use computing resources in instruction; guidance which can be provided in the form of professional development workshops, as well as one-on-one assistance.

The workshop topics that correlated the most highly with integration in this current study fit into this instructional frame of reference. Respondents who were provided workshops on creating one's own language-learning activities, teaching with Internet resources, and teaching students to use computers in language learning (such as creating websites or multimedia) had higher degrees of integration of computers.

These findings reflect a trend amongst those with higher degrees of integration to use computers as a tool in learning rather than as a tutor or surrogate teacher. This is found further in that teachers who attended workshops on topics such as graphics or image-editing software and computer audio and video had slightly higher levels of integration than those attending workshops that focused on teaching with language learning software (which would correspond more closely with the tutor mode of computer use). Thus, these results indicating the topics that most closely correlate with greater degrees of integration support the notion that, as in general education, the use of the computer as a tool in language learning is more conducive to integration than the use of the computer as a tutor or surrogate teacher. .

Research Question 4

What is the relationship between the availability of one-on-one assistance and the extent of integration?

To obtain higher levels of computer integration in teachers' instruction requires time and technology support that exceeds maintenance of computer hardware and software, and that exceeds instruction in the basic operation of computers (Glennan & Melmed, 1996; NCES, 2000; OTA, 1995; Report to the President, 1997; Ronnkvist, *et al.*, 2000; Sandholtz *et al.,* 1997). It requires assistance with the "deeper pedagogical challenges" (Report to the President, 1997, Section 5.2) that goes beyond the basics of computer use; assistance that enables teachers to use computers to improve their students' learning, not just to learn how to operate the equipment (CEO Forum, 1999).

In addition to professional development workshops, teachers also need time to experiment with and understand how they may individually integrate computers into their teaching. One study reported that a lack of time to experiment and become familiar with the computers and software available was the greatest barrier to teachers' use of technology in their teaching (NCES, 2000). Ronnkvist *et al.* (2000) indicated that an important accompaniment to this individualized application is the availability of just-in-time, or one-on-one assistance.

This current study also found that one-on-one assistance in the area of instructional support is related to higher degrees of computer integration as well. The speed at which assistance with instructional issues was provided along with who provided that assistance had the greatest impact on computer integration. Thus, those respondents with support personnel who were able to provide timely one-on-one instructional assistance exhibited higher degrees of computer integration in their teaching.

Interestingly, an examination of the frequency distributions of the measures of who provided one-on-one assistance revealed that for technical assistance, the provider is a technical support person in 85 percent of the cases. However, the provider of instructional one-on-one assistance is most often another teacher (68%), closely followed by a technical support person (62%). While technical assistance is almost always relegated to technical professionals, the same priority is not afforded to instructional assistance, leaving it rather to be accomplished through the day-to-day sharing amongst the faculty. However, the data reveal that those with support personnel who provide the one-on-one assistance exhibit greater degrees of computer integration in their teaching. Thus, it seems that, in terms of institutional priorities, instructional assistance still lags behind technical assistance.

Research Question 5

What is the relationship between the provision of professional incentives and the extent of integration?

Little has been written about incentives to use technology in teaching. Ronnkvist *et al.* (2000) did not set out to examine incentives for technology use; however, they found that teachers reported the provision of Internet access through the school district as well as the provision of laptops they could use both at home and at school as being helpful to their integration of technology into their teaching. In contrast, this current study found Internet access at home or school to be one of the weakest correlations with integration. The strongest relationships were between integration and professional advancement and formal recognition. Unexpectedly, financial benefits or increases in pay was the incentive that had the weakest relationship with integration.

These findings suggest that greater computer integration can be motivated without the expenditure of large portions of the budget in terms of salary increases or bonuses.

Creativity on the part of administrators to reward attempts to integrate computers into teaching may be more effective and more cost-efficient. Furthermore, these results indicate that recognition of the effort required to implement technology effectively in one's teaching and consideration of those efforts during evaluations or tenure reviews would seem to have a greater impact on computer integration than financial rewards alone. These findings may indicate that, at the college level, more attention needs to be paid to assessing technology-in-teaching accomplishments as well as publications and conference presentations.

This study also inquired as to disincentives to computer integration. An examination of the individual disincentives correlations with integration revealed a negative correlation between lack of training how to use computers in teaching and integration. In other words, as the level of lack of training increases, the level of integration decreases. This finding serves to provide further corroboration of the findings of this study previously discussed: computer integration in teaching correlates significantly with the amount and quality of training in how to instructionally use computers.

Research Question 6

What are the relationships between the aspects of technology support and the degree of computer integration?

An examination of the relationships the five aspects of technology support (computers, staff, professional development, one-on-one assistance, and incentives) have with the degree of integration revealed professional development to have the strongest relationship. It accounts for 23 percent of the variance in computer integration. This finding reinforces what the analyses of the individual aspects of technology support revealed and substantiates that, as in K-12 education, the presence of computers alone is insufficient for the integration of computing technologies into one's teaching. In fact, the analysis for this question indicated that the index for computers accounted for only 18 percent of the variance in integration. Additional analyses utilizing the demographic data collected by the survey instrument as control variables showed no significant differences in the results.

Research Question 7

For what types of activities do foreign language instructors use computing technologies the most in their instruction?

The results of the analysis of the data indicate that some progress has been made in how instructors use computers in their teaching. In 1998, Craven and Sinyor found that drill and practice activities were the number one way in which teachers used computers in their foreign language teaching; however, this study found drill and practice uses to have fallen, though it is still rather high in the frequency of actives used. Word processing has now risen to the top of the list, followed by the use of the Internet as a resource. These findings suggest that teachers are in fact beginning to use the computers more as a tool in language learning than as a tutor. Unfortunately, drill and practice activities are still rather high in frequency of use, as are the textbook CD's which often provide additional worksheet type activities. These results suggest that there is still a great need for professional development in how to create a more project-oriented approach that more readily facilitates a fuller integration of computers into the curriculum.

Research Question 8

How do respondents' attitudes and beliefs about the use of computing technologies in their instruction correlate with their actual usage?

The correlation between respondents' attitudes about the use of computing technologies in foreign language education and the actual frequency of their use indicates that respondents are experiencing success in actually implementing the use of computers in their teaching. Further, this correlation indicates that computer integration is not an ideal or unreachable goal for these respondents, but rather is something that is a part of their praxis.

One caveat to keep in mind, however, is that these results do not speak to the issue of how widely computing technologies are being used or not used within FL education, since the respondents to this survey were more than likely those who are to some degree comfortable with or interested in the use of computers in their teaching. Nevertheless, the high degree of correlation between what teachers believe about the use of computers and their actual use of the tools in their teaching suggests that this study was successful in reaching its intended population; those foreign language teachers who actually use computing technologies in their teaching, This further strengthens the reliability of the data that have been collected and analyzed as a part of this study.

Implications for teachers and administrators

Administrators should recognize that a significant portion of their resources needs to be focused on issues of technology support; however, this technology support needs to be multifaceted, going beyond simple technical support that maintains the usability of the computers and technology. Although this study found professional development workshops on how to integrate technology into teaching has the strongest correlation with and is the best predictor of the level of computer integration in teaching, it is clear that it is not the only aspect of technology support that deserves attention. As was found by Ronnkvist *et al* (2000), optimal integration of computing technologies into teaching requires an organized coordination of all five of the aspects of technology support. Foreign language programs will see the greatest integration and utilization of their computing technologies when they provide adequate and available computers; support staff competent in technical support as well as instructional support; frequent, in-depth, professional development opportunities that focus on the instructional use of computers, timely, just-in-time one-on-one assistance in how to use computers in teaching; and professional advancement incentives

Furthermore, teachers must receive time to review and experiment with technology to become comfortable with its use. Those serious about having their faculty integrate computers and technology into their teaching need to provide release time, along with one-on-one assistance, to enable teachers to become familiar with the resources available. Failure to do so, or requiring teachers to learn these new skills on their own time, will only result in lower levels of computer utilization and integration.

Directions for Future Research

There are many directions for future research on this subject. Moore's Law (Intel Corporation, 2005) states that the number of transistors that can fit on an integrated circuit doubles approximately every 24 months. This translates to exponentially greater increases in computing power and decreases in computer sizes at a very rapid rate. Since the inception and completion of this research, the use of notebook computers by students has increased, and networking technologies, including the pervasiveness of wireless networking, make it more possible today to compute from any location on campus and at home. Further, with the increases in the speeds of information transfer on today's computing networks, previously recorded video, as well as synchronous audio and video communications are now possible and common. All of these recent, but now somewhat common innovations have the potential to greatly change how computing technologies are used for language learning and must be considered in any future research into how and why technology may be used in foreign language learning.

Although this current study found that professional development is the best predictor for integration, further research should explore which professional development workshop topics correlate most with greater degrees of integration of computers: what aspects of "integrating computers" teachers need help with the most. Furthermore, an investigation into which format of workshop provides the greatest return on the resources invested should be carried out. Foreign language departments need to know if multi-day workshops are necessary, or if single or even half day workshops are just as effective in helping teachers learn to integrate computers into their teaching.

Another area for future study is in the area of online computer activities in support of language learning. Specifically, social networking websites that provide numerous easy opportunities for communication with others and the development of large interconnected networks of social contacts. These sites go beyond simple online chat, allowing for communication through a variety of media and multiple languages. Such sites provide numerous opportunities for interactive communication with other users.

Virtual online worlds and gaming environments is yet another advanced online capability that has potential for language learning. Peterson (2006) found that avatars, animated characters users create to represent themselves within the virtual world, give language learners a more immersive presence and sense of interaction within these virtual environments. These avatars move and walk around the virtual three dimensional world and interact with other avatars representative of other users providing real-time CMC. The ability to use body language, facial expressions, and to show emotions visually through the avatar allow students to become more involve in the online interactions.

Additional study would also be beneficial in the establishment of a more specific definition for computer integration. What exactly does it mean to integrate computers into one's teaching? Is using Microsoft PowerPoint every day in the presentation of a lecture or talk integration of technology? Is the use of the computer administratively for the recording of attendance or grades integration?

Garret (2009) argues that true CALL integration requires more than just the utilization of technology in teaching or administration. She argues that the three elements of pedagogy, theory, and technology must inform and react to one another in the development of truly integrative technology based learning activities. Using the computer for e-mail or finding authentic materials on the Web to share with the class are not the full integration of the computer into language learning. For her, CALL integration "designates a dynamic complex in which technology, theory, and pedagogy are inseparably interwoven" (p. 720).

Finally, additional research into the impact student-owned, wireless-connected laptops have had on foreign language computer labs is needed to ascertain whether or not the expenditure of resources for such equipment is justifiable. As CALL becomes an increasingly online activity, utilizing resources found on the Internet through publicly or privately available websites, it becomes more mobile, and is freed from the confines of a language lab full of computers using CD's to access the language learning resources. Portable, or mobile, computing devices continue to shrink in physical size while growing in computing power and may at some point in the future make the computer language lab obsolete.

Limitations of this Study

This study is limited in its scope in that it did not include a survey of Intensive English Language programs or Intensive Foreign Language programs in the sample. It focused solely on instructor's practices in foreign language departments at 4-year colleges and universities. In addition, this study did not include junior or community (two-year) colleges due to the small number of foreign language programs offered at such colleges.

Furthermore, the respondents to the survey were by design those instructors at the targeted institutions who use computers to some degree in their teaching. The purpose of the study was to explore and examine the factors that have the greatest impact on the use of computing technologies by technology-adept instructors. This study was not intended to examine all instructors' use of or attitudes toward technology; thus, the results are generalizable only to the population of instructors who are familiar with and use technology in their teaching.

Summary and Conclusion

The rapid changes in computing technologies will impact their availability and form, but they will not alter the basic findings of this study. With the ever-increasing growth in the availability and power of technology comes the increasing need for more instruction in how to use that technology to teach well. As indicated by the recent article reported at the beginning of this chapter, the misuse of technology, namely the ubiquitous but poor use of PowerPoint for lecture outlines by instructors in college classrooms today, has led to greater boredom and inattention on the part of students (Young, 2009).

This study set out to investigate whether or not the aspects of technology support that were found to impact the integration of computing technologies in K-12 education had the same effect on the integration of computers in the teaching of foreign languages at four-year universities. The results, though not indicative of causation, demonstrate that there is a significant positive relationship between the provision of fully developed technology support as described by Ronnkvist *et al.*(2000) and the degree of computer integration in college foreign language classrooms. It is not simply technical support, such as maintenance of the computer hardware or software, but rather it includes instructional support that guides and assists teachers in the utilization of computers through a focus on integration into their teaching.

The goal of this study is to provide guidance to decision makers in their use of the limited resources their departments have for technology. Ideally, training in how to use the available technology resources in teaching foreign languages will be more readily available to faculty; thus, enabling them to enhance their students' experiences of learning a foreign language. The potential is great.

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Appendices

Appendix A: Construct Worksheets for Focus Group 1

What does Technology Support include?

Computer Availability

Technology Coordinator

One-on-one assistance when needed

Professional Development opportunities

Incentives to use computers

Appendix A (Continued)

Availability of Computers as an aspect of Technology Support

Sufficient Numbers:
Are there enough computers to use with an entire class at once?
Yes/No

Location:
Where are the computers located?
classroom, foreign language computer lab, general use computer lab

Types:
What types of computers do you *usually* use with your class?
Desktops, notebooks on a cart you can move to the class, students' notebook computers

Ease of Access:
How far in advance must you submit a request to use the computers for a class meeting?
No advance required, 1 day, a few days, a week or more in advance

Individual use:
The teachers individual use of a computer while at school

a computer assigned only to the teacher,

a computer shared with 2 or 3 other faculty,

a computer shared with 4 or more faculty,

a computer in a lab also used by students, no computer is available

Student/Computer ratio:

1 computer per student

1 computer for 2-3 students

1 computer for 4-5 students

1 computer for 6 or more students

Currency of computers and software:
How up-to-date are the computers and software that are available?
Out-of-date ←――――――――→ Up-to-date

Appendix A (Continued)

A Technology Coordinator as an aspect of Technology Support

Availability:
Is a technology coordinator (staff member whose primary job is to assist teachers with their use of computers) available?

Yes / No

Full/Part-time:

Is the technology coordinator full time or part time?

Full / Part - time

Knowledge:
Rated on a scale: Not very knowledgeable ←——→ Very knowledgeable

General computer knowledge

Operation of computers and software

Use of computers in teaching

How to troubleshoot / solve computer and/or software problems

Responsibilities/Division of labor

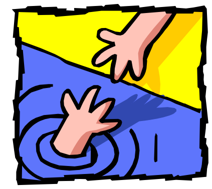
For what is the technology coordinator responsible?

Tech support only (i.e., no teaching or other administrative duties)

Tech support plus teaching or other administrative duties

Appendix A (Continued)

One-on-one (personal) Assistance as an aspect of Technology Support



Provider of one-on-one assistance:

Technical issues (operating computers)

- Tech Coordinator
- Another teacher
- Secretary or other staff member
- Your student(s)
- Nobody

Instructional issues (using computers in teaching)

- Tech Coordinator
- Another teacher
- Secretary or other staff member
- Your student(s)
- Nobody

Kind of assistance needed most often:

- Technical
- Instructional

Speed with which you can obtain one-on-one assistance

Technical issues

- In a week or 2
- In a day or 2
- Later the same day
- Right away
- Not available

Instructional issues

- In a week or 2
- In a day or 2
- Later the same day
- Right away
- Not available

Appendix A (Continued)

Professional Development (workshops) as an aspect of

Technology Support

Frequency and types of workshops:

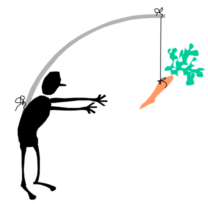
	None	1-2 a year	1-2 a month	1-2 a month	More than 1-2 a month
1-2 hour wkshps					
Half-day wkshps					
Full-day wkshps					
Multi-day wkshps					

Frequency of workshop topics:

	Number of workshops				
	0	1	2	3	4+
Operating computers / software					
Troubleshooting / advanced computer training					
Using online course management websites (Like Blackboard, WebCT, Nicenet, etc.)					
Selecting software that matches your instructional goals					
Creating your own language-learning computer activities					
Using Internet resources in your classes					
Teaching students to create websites					
Teaching students to create multimedia presentations (Like PowerPoint, etc.)					
Others??					

Appendix A (Continued)

Incentives to use computers as an aspect of Technology Support



Incentives Actually Available:
How frequently are each of the following provided as incentives to use computers in your instruction?

Financial stipends / pay increases

Computer / internet access at school

Internet access at home

Release time (e.g., to experiment with computers, etc.)

Formal Recognition (e.g., professional advancement, etc.)

Preferential treatment (e.g., first choice of classes or times)

Informal Recognition (e.g., gifts, awards, public acknowledgement)

Other??

Perceived value of possible incentives:
How much more would you use computers in your teaching if the following incentives were offered?

Financial stipends / pay increases

Computer / internet access at school

Internet access at home

Release time (e.g., to experiment with computers, etc.)

Formal Recognition (e.g., professional advancement, etc.)

Preferential treatment (e.g., first choice of classes or times)

Informal Recognition (e.g., gifts, awards, public acknowledgement)

Other??

Appendix A (Continued)

Each group receives one aspect of technology support to discuss. As you think about your aspect of technology support, consider the following:

1. First, look at the main categories (in ***bold italicized*** text)
   - Are all of the categories clear? What is confusing / unclear?
   - Are there any categories that are missing and should be added?
   - Are there any categories that don't seem that important or irrelevant? Should they be removed or do they just need to be changed? How would you change them?
2. Second, look at the individual items (if any) listed under each category.
   - Are all of the categories clear? What is confusing / unclear?
   - Are there any items that are missing and should be added?
   - Are there any items that don't seem that important or irrelevant? Should they be removed or do they just need to be changed? How would you change them?
3. Any final suggestions / thoughts regarding this aspect of technology support?
4. Any suggestions for other aspects of technology support that are not included in the 5 listed thus far?

Appendix B: Survey Instrument

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION in ADULT FOREIGN LANGUAGE EDUCATION

Welcome and Thank You for your Participation!

This study examines the kinds of technology support that best help foreign language teachers use computers in their teaching.

Completing the questionnaire takes approximately 15-20 minutes.

Please mark your responses clearly in the ways requested for each question. Once you have completed the questionnaire, please return it in the postage-prepaid envelope.

If you are ready to begin, **please turn to page 3 to start**.

Thank you again for your participation!
If you have any difficulties or questions, please contact Jim Green at: jgreen@cas.usf.edu
or call 1-813-974-4230.

Information for People Who Take Part in this Study

The following information is being presented to help you decide whether or not you want to take part in a minimal risk research study. Please read this carefully. If you do not understand anything, please contact Jim Green at jgreen@cas.usf.edu or at (813) 974-4230.

Title of Study:
The Relationship between Technology Support and Extent of Technology Integration into College-level Foreign Language Curricula

Principal Investigator:
James T. Green

Study Location(s):
University of South Florida, Tampa, FL and via a mailed survey instrument. You are being asked to participate because you are an instructor of a foreign language to college-level adults.

General Information about the Research Study
The purpose of this research study is to analyze how technology support relates to the degree of computer integration into the curricula of college-level foreign language programs.

Plan of Study
The study will be conducted by means of a survey. If you choose to participate, you may choose to respond to the survey online, or you may request a paper copy be mailed to you, along with a postage-paid reply envelope. Responding to the survey should take no more than 15-20 minutes of your time and your responses will be completely anonymous.
In addition, if you are willing to provide your telephone contact information, you may be randomly selected and contacted for a brief 10-15 minute follow-up interview via telephone.

Payment for Participation
You will not be paid for your participation in this study.

Benefits of Being a Part of this Research Study
By participating in this study you help increase the overall understanding of which technology support conditions correlate the most highly with increased computer integration in foreign language education.

Risks of Being a Part of this Research Study
There are no risks to being a part of this research study.

Appendix B (Continued)

Confidentiality of Your Records
Your privacy and research records will be kept confidential to the extent of the law. Authorized research personnel, employees of the Department of Health and Human Services, and the USF Institutional Review Board may inspect the records from this research project.
The results of this study may be published. However, the data obtained from you will be combined with data from others in the publication. The published results will not include your name or any other information that would personally identify you in any way. Although an institutional identification code is used to keep responses from the same institution together, neither individual nor institutional identities will be tracked or stored. Personally identifying information will not be requested as a part of the survey.

Volunteering to Be Part of this Research Study
Your decision to participate in this research study is completely voluntary. You are free to participate in this research study or to withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive, if you stop taking part in the study.

Questions and Contacts
- If you have any questions about this research study, contact James T. Green at (813) 974-4230, jgreen@cas.usf.edu
- If you have questions about your rights as a person who is taking part in a research study, you may contact the Division of Research Compliance of the University of South Florida at (813) 974-5638.

Consent to Take Part in This Research Study
By continuing, you agree that:
- You have fully read or have had read and explained to you this informed consent form describing this research project.
- If desired, you have had the opportunity to question the person in charge of this research and have received satisfactory answers.
- You understand that you are being asked to participate in research. You understand the risks and benefits, and you freely give your consent to participate in the research project outlined in this form, under the conditions indicated in it.

;

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

1. Is foreign language study required for any students other than language majors at your school?

Select one ➡

- Yes ☐
- No ☐

2. Is your college or university a . . .

Select one ➡

- Public institution? ☐
- Private institution? ☐

3. Approximately how many students attend your school?

Select one ➡

- Less than 1000 ☐
- 1000 - 5000 ☐
- 5001 - 10,000 ☐
- 10,001 - 20,000 ☐
- More than 20,000 ☐

4. In what state is your school located?

Write your answer in the box ➔ ☐

5. Is the language you primarily teach the same as your first (native) language?

Select one ➔

- No ☐
- Yes ☐

6. How many hours per week do you teach foreign language classes?

Write your answer in the box ➔ ☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

Computers in Your Teaching

For the remainder of the survey, please answer according to the foreign language class in which you use computers the most in your teaching.

7. In your opinion, how important are computer-based activities in your teaching?

Select one ➔

← Not Very Important					→ Very Important
☐	☐	☐	☐	☐	☐

8. What percentage of class time do your students usually use computers in some way each week?

Select one ➔

☐	☐	☐	☐	☐	☐	☐	☐	☐
			50%					100%

9. Over the past 6 months to a year, how frequently have students used computers to complete the following activities in the target language?

Select one box in each row for both in class and outside class

Part A: **G**eneral **C**omputer **A**pplications (If the activity-type is not available to you, please select **NA**)

		← Never					Frequently →	NA
Word processing	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐
Desktop publishing	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐
Creation of Multimedia presentations (e.g. PowerPoint)	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐
Collaborative writing / projects	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐
Games, simulations, puzzles, or exploratory programs	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

Computers in Your Teaching

Over the past 6 months to a year, how frequently have students used computers to complete the following activities in the target language? (continued)

Select one box in each row for both in class and outside class

Part B: **L**anguage **L**earning **P**rograms (If the activity-type is not available to you, please select **NA**)

		Never					Frequently	NA
A textbook supplemental CD	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐
Drill-and-Practice/Workbook-type drills	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐
Language tutorials: Integrated skills (e.g. integrated reading and writing with a focus on communication)	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐
Language tutorials: Discrete skills (e.g. separate focus on reading, writing, …)	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐

Select one box in each row for both in class and outside class

Part C: **I**nternet **R**esources (If the activity-type is not available to you, please select **NA**)

		Never					Frequently	NA
Email, chat (instant messaging), or online discussion boards/blogs	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐
Research using the Internet	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐
Realia on the Internet (Music Videos, Newscasts, etc.)	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐
Webquests	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐
Creation of a website	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐

Part D: **S**omething **N**ot in the **L**ist **A**bove (If the activity-type is not available to you, please select **NA**)

		Never					Frequently	NA
Other (Please specify below):	In Class	☐	☐	☐	☐	☐	☐	☐
	Outside Class	☐	☐	☐	☐	☐	☐	☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

Computers in Your Teaching

For each question on this page, select *ONLY ONE* box in each continuum

10. How often do your students use computers *during class time*?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

←Hardly ever | Occasionally | Often→

11. How often do you assign homework requiring the use of computers?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

←Hardly ever | Occasionally | Often→

12. How do you *feel* about using computers in your language teaching?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

← I don't really like using them | It's a love/hate relationship | I really enjoy using them →

13. Regardless of how you feel about computers, are they useful in language learning?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

←They're not very useful. | They're somewhat useful. | They're pretty useful. | They're essential→

14. What kinds of computer activities do you *usually* assign?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

← Don't assign computer activities | Mostly workbook-type (drill-and-practice) computer activities | A combination of workbook-type / communicative (e.g. word processing) activities. | Mostly communicative or project-based activities →

15. How competent do you feel to use computers in your teaching?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

←I know very little | I'm starting to learn | I'm somewhat competent | I feel very competent →

16. How do you interact with others about using computers in teaching?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

← I almost never talk about how to use computers | I get ideas from others | Sometimes I share my ideas with others | Others look to me as a guide/mentor →

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

The Computers Available to You

17. Are enough computers available for you to use with an entire class at one time?

Yes ☐

No ☐

If **NO**, go to question **18**

If YES

If **YES**, indicate the *primary* location of the computers you use.
Select only one

- In a classroom ☐
- In a technology-ready classroom ☐
- In a Foreign Language Computer / Media Lab ☐
- In a General Use Computer / Media Lab ☐

18. When you use computers in your class, what is the ratio of computers to students?

Select one ➔

- 1 computer for each student ☐
- 1 computer for every 2-3 students ☐
- 1 computer for every 4-5 students ☐
- 1 computer for every 6 or more students ☐

19. What types of computers do you *usually* use with your class?

Select one ➔

- Stationary Desktop computers (non-portable) ☐
- Laptops/Notebook computers on a cart that can be moved to where they are needed ☐
- Laptop/Notebook computers in a lab ☐
- Laptops / Notebook computers brought by students ☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

The Computers Available to You

20. Generally, how far in advance must you make a request if you wish to use computers with an entire class?

Select one ➔

No advance notice is needed	☐
1 day advance notice is needed	☐
A few days advance notice is needed	☐
A week or more advance notice is needed	☐
No request is needed because I am scheduled to use a computer lab on a regular basis.	☐

21. How would you rate the computers available to your students?

Select one ➔

	Poor	Fair	Good	Excellent	Don't Know
Computer Speed	☐	☐	☐	☐	☐
Internet Connection Speed	☐	☐	☐	☐	☐
Language-learning software availability	☐	☐	☐	☐	☐
Multimedia capabilities (video and audio)	☐	☐	☐	☐	☐
Multi-language capabilities (e.g., non-English fonts)	☐	☐	☐	☐	☐

22. To what extent is a computer available for your *individual use* while at school?

Select one ➔

I bring my own laptop/notebook to the office	☐
I use a computer assigned only to me	☐
I share a computer with others, but can usually use it when I need to	☐
I share a computer with others, and often need to wait to use it	☐
No computer is available to me	☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

The Technology Support Staff Available to You

23. A "Technology Coordinator" is a staff member whose *primary* job is to assist teachers with every aspect of computer use. Some departments have a single person in this role, while others split the responsibilities up between 2 or more people.

Select one in each row

Does your department have at least one person who helps you when the computers don't work **(technical support)**?	No ☐	Yes ☐
Does your department have at least one person who helps you learn how to use computers in your teaching **(instructional support)**?	No ☐	Yes ☐
Is a single individual responsible for both technical **and** instructional support in your department?	No ☐	Yes ☐

If you answered **NO**, answer questions 24-26 in the white box below:

24. Are your technology support personnel full-time or part-time (less than 40 hours per week)?

Select one in each row

Technical support personnel	Full time ☐	Part time ☐
Instructional support personnel	Full time ☐	Part time ☐

25. A: Does your technical support person have any additional responsibilities?

- **No**, technical support only (i.e., no teaching or administrative duties) ☐
- **Yes**, technical support plus teaching or other administrative duties ☐

25. B: Does your instructional support person have any additional responsibilities?

- **No**, instructional support only (i.e., no teaching or administrative duties) ☐
- **Yes**, instructional support plus teaching or other administrative duties ☐

If you answered **YES**, answer questions 24-26 in the gray box below:

24. Is your single technology support person full-time or part-time (less than 40 hours per week)?

Select one ➔ Full time ☐ Part time ☐

25. Does your single technology support person have any additional responsibilities?

Select one

- **No**, technical and instructional support only (i.e., no teaching or administrative duties) ☐
- **Yes**, technical and instructional support plus teaching or other administrative duties ☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

26. A: Please rate your technical support person's competence in each of the following:

	Not Very Competent					Very Competent
Using computers in teaching	☐	☐	☐	☐	☐	☐
Selecting software for language teaching	☐	☐	☐	☐	☐	☐
Using the Internet in language teaching	☐	☐	☐	☐	☐	☐
Creating/Using computer multimedia (audio/video) in teaching	☐	☐	☐	☐	☐	☐
Helping you integrate computers into your teaching	☐	☐	☐	☐	☐	☐

26. B: Please rate your instructional support person's competence in each of the following:

	Not Very Competent					Very Competent
Operating computers and software	☐	☐	☐	☐	☐	☐
Maintaining computer availability	☐	☐	☐	☐	☐	☐
Troubleshooting/repairing hardware problems	☐	☐	☐	☐	☐	☐
Troubleshooting/solving software problems	☐	☐	☐	☐	☐	☐
Customizing computers for instructors' needs	☐	☐	☐	☐	☐	☐

26. Please rate your single technology support person's competence in each of the following:

	Not Very Competent				Very Competent
Operating computers and software	☐	☐	☐	☐	☐
Maintaining computer availability	☐	☐	☐	☐	☐
Troubleshooting/repairin g hardware problems	☐	☐	☐	☐	☐
Troubleshooting/solving software problems	☐	☐	☐	☐	☐
Customizing computers for instructors' needs	☐	☐	☐	☐	☐
Using computers in teaching	☐	☐	☐	☐	☐
Selecting software for language teaching	☐	☐	☐	☐	☐
Using the Internet in language teaching	☐	☐	☐	☐	☐
Creating/Using computer multimedia (audio/video) in teaching	☐	☐	☐	☐	☐
Helping you integrate computers into your teaching	☐	☐	☐	☐	☐

Appendix B (Continued)
TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

Personal One-on-One Assistance Available to You

26. Which kind of personal, one-on-one assistance do you need most often?

Select one ➔

Help with **TECHNICAL** issues (e.g., operating or fixing computers, software, etc.)	☐
Help with **INSTRUCTIONAL** issues (e.g., Using computers in teaching, selecting software to match students' needs)	☐

27. Who is usually the main provider of one-on-one assistance for the following kinds of issues?

Select one in each row ➔

	Technology support staff	Another teacher	Secretary	Your student(s)	Nobody
TECHNICAL issues (e.g., operating or fixing computers and software)	☐	☐	☐	☐	☐
INSTRUCTIONAL issues (e.g., using computers in teaching)	☐	☐	☐	☐	☐

28. How quickly can you *usually* obtain one-on-one assistance with the following when you need it?
(Select NA if one-on-one assistance is not available)

Select one in each row ➔

	In a week or 2	In a day or 2	Later the same day	Right Away	NA
TECHNICAL issues (e.g., operating, fixing computers/software)	☐	☐	☐	☐	☐
INSTRUCTIONAL issues (e.g., using computers in teaching)	☐	☐	☐	☐	☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

Professional Development Available to You

29. During the past year, how frequently have the following types of workshops or classes been available to you?

Select one in each row ➔

	Don't know	None	1-2 a year	1-2 each school term	1-2 a month	More than 2 a month
1- to 2-hour workshops / classes	☐	☐	☐	☐	☐	☐
3- to 4-hour workshops / classes	☐	☐	☐	☐	☐	☐
Full-day workshops / classes	☐	☐	☐	☐	☐	☐
Multi-day workshops / classes	☐	☐	☐	☐	☐	☐

30. During the past year, about how many workshops or classes on the following topics were available to you?

Part A

Select one in each row 🡻

	Number of workshops / classes				
	Don't know	0	1-2	3-4	5+
Basic computer use	☐	☐	☐	☐	☐
Hardware / software troubleshooting	☐	☐	☐	☐	☐
Productivity software (e.g., word processors, spreadsheets)	☐	☐	☐	☐	☐
Graphics / image editing software	☐	☐	☐	☐	☐
Computer audio/video	☐	☐	☐	☐	☐

Part B

Select one in each row 🡻

	Number of workshops / classes				
	Don't know	0	1-2	3-4	5+
Teaching with language learning software	☐	☐	☐	☐	☐
Teaching with Internet resources	☐	☐	☐	☐	☐
Teaching students to use computers in language learning (creating websites, multimedia)	☐	☐	☐	☐	☐

Part C

Select one in each row 🡻

	Number of workshops / classes				
	Don't know	0	1-2	3-4	5+
Creating your own language-learning activities	☐	☐	☐	☐	☐
Online course management (WebCT, Blackboard, etc.)	☐	☐	☐	☐	☐
Other (Please specify below):	☐	☐	☐	☐	☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

Incentives Available to You

31. How frequently are each of the following provided as incentives to motivate you to use computers more in your instruction?
Select "NA" if the incentive has never been offered.

Part A

Select one in each

	Rarely					Frequently	NA
Financial stipends or pay increases	☐	☐	☐	☐	☐	☐	☐
Computer or laptop loan	☐	☐	☐	☐	☐	☐	☐
Computer / Internet access at school	☐	☐	☐	☐	☐	☐	☐
Internet access at home	☐	☐	☐	☐	☐	☐	☐
Release time e.g. to experiment using computers	☐	☐	☐	☐	☐	☐	☐

Part B

Select one in each

	Rarely					Frequently	NA
Professional advancement	☐	☐	☐	☐	☐	☐	☐
Formal recognition e.g. public recognition, awards	☐	☐	☐	☐	☐	☐	☐
Preferential treatment e.g. first choice of classes or times	☐	☐	☐	☐	☐	☐	☐
Informal recognition e.g. a pat on the back	☐	☐	☐	☐	☐	☐	☐
Other (Please specify below)	☐	☐	☐	☐	☐	☐	☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

Incentives Available to You

32. How much more would you use computers in your teaching if the following incentives were offered?

Part A

Select one in each row ➔

	No More					Much More
Financial stipends or pay increases	☐	☐	☐	☐	☐	☐
Computer or laptop loan	☐	☐	☐	☐	☐	☐
Computer / Internet access at school	☐	☐	☐	☐	☐	☐
Internet access at home	☐	☐	☐	☐	☐	☐
Release time e.g. to experiment using computers	☐	☐	☐	☐	☐	☐

Part B

Select one in each row ➔

	No More					Much More
Professional advancement	☐	☐	☐	☐	☐	☐
Formal recognition e.g. public recognition, awards	☐	☐	☐	☐	☐	☐
Preferential treatment e.g. first choice of classes or times	☐	☐	☐	☐	☐	☐
Informal recognition e.g. a pat on the back	☐	☐	☐	☐	☐	☐
Other (Please specify in box below)	☐	☐	☐	☐	☐	☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

Disincentives You Encounter

33. To what degree do the following discourage you from using computers in your language teaching?

Part A

Select one in each row ➔

	← Not Much					Very Much →
Unavailable technology support personnel	☐	☐	☐	☐	☐	☐
Unapproachable / intimidating technical personnel	☐	☐	☐	☐	☐	☐
Lack of training in how to use the computer	☐	☐	☐	☐	☐	☐
Lack of training in how to use computer activities in teaching	☐	☐	☐	☐	☐	☐
Extra preparation time it takes to use computers in teaching	☐	☐	☐	☐	☐	☐

Part B

Select one in each row

	← Not Much					Very Much →
Unreliable computers	☐	☐	☐	☐	☐	☐
Inadequate number of computers	☐	☐	☐	☐	☐	☐
Inadequate computers (e.g., too slow, not powerful enough)	☐	☐	☐	☐	☐	☐
Other (Please specify below)	☐	☐	☐	☐	☐	☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

Information about Yourself

34. Please indicate your position in relation to the following thoughts about teaching.

For each item in this question, select *ONLY ONE* box in each continuum

Teachers know the subject. It's their job to present it to their students.	☐ ←	☐	☐	☐	☐	☐ →	Teachers should provide students with the opportunities, incentives, and resources to build their own subject knowledge and skill.
Classes should follow lesson plans and a fixed curriculum.	☐ ←	☐	☐	☐	☐	☐ →	Students' questions should guide the direction of study in the class.
A "good" classroom has students individually working on tasks structured to instruct or provide practice of the knowledge to be learned.	☐ ←	☐	☐	☐	☐	☐ →	A "good" classroom has students collaboratively working together on a variety of projects or tasks.

35. What is your gender?

Select one →

Female ☐

Male ☐

36. What is your age today?

Select one →

Less than 20	21 - 30	31 - 40	41 - 50	51 - 60	61 - 70	Over 70
☐	☐	☐	☐	☐	☐	☐

37. How would you rate your overall computer competence (outside of teaching)?

Select one →

← Very Low					Very High →
☐	☐	☐	☐	☐	☐

38. Which of the following has helped you the most in learning to use computers?

Select one →

Using a computer at home (self-taught) ☐

Using a computer for office work (self-taught) ☐

Using a computer in my teaching (self-taught) ☐

Workshops or courses ☐

Friends or colleagues ☐

Other (Please specify) ☐

Appendix B (Continued)

TECHNOLOGY SUPPORT and COMPUTER INTEGRATION

Information about Yourself

39. In your professional preparation, how frequently did your instructor(s) model the use of computers in teaching by using them in class?

Select one ➔

← Never					Always →
☐	☐	☐	☐	☐	☐

40. Including this year, how many years have you been employed as a foreign language teacher?

Select one ➔

Less than 1	1 - 2	3 - 5	6 - 10	11+
☐	☐	☐	☐	☐

41. What is your employment status as a language teacher?

Select one ➔

- Full-time tenure-track instructor ☐
- Full-time non-tenure-track instructor ☐
- Graduate teaching assistant ☐
- Part-time adjunct instructor ☐

42. Please indicate the highest degree you have completed.

Select one

- High school diploma ☐
- 2-year college degree ☐
- 4-year college degree ☐
- Master's degree ☐
- Ph.D. ☐

43. In what area did you major in the highest degree completed?

Select one

- Language / Literature: The language I primarily teach ☐
- Language / Literature: A language other than the one I primarily teach ☐
- Linguistics ☐
- Foreign Language Education / Second Language Acquisition / Applied Linguistics ☐
- Other (Please specify) ☐

Appendix B (Continued)

Information about Yourself

44. How recently did you complete your education?

Select one

- Still in school ☐
- Within the last 12 months ☐
- 1-4 years ago ☐
- 5-9 years ago ☐
- 10-20 years ago ☐

Appendix B (Continued)

Contact Information

In addition to this questionnaire, a number of randomly selected telephone interviews of approximately 15 minutes will be conducted to address issues that emerge or require greater attention once the data are analyzed.

If you are willing to participate in a telephone interview, please indicate this below:

☐ **Yes**, you may contact me by telephone for a brief interview. ☐ **No**, please do not contact me.

(Select one)

If you selected Yes, please provide the following:

Title: ☐**Dr.** ☐**Mr.** ☐**Ms.** ☐**Miss** ☐**Mrs.**

Name: ☐

Phone Number: ☐ ☐ ☐

Area Code **Number** **Extension**

The best time to contact is between: ☐ ☐ ☐ **and** ☐ ☐ ☐

Time **am pm** **Time** **am pm**

Special Note: ☐

Your contact information will be kept *completely confidential* and used *only* for the purposes of this study. In addition, it will be kept separate from your responses to this questionnaire to maintain your anonymity.

Appendix C: First E-mail Message to FL Instructors

Dear __________:

A nationwide study investigating computer integration into college-level foreign language teaching is about to commence. Foreign language departments often expend valuable resources acquiring computers only to find them scarcely used by instructors and students. This study will examine which aspects of technology support most strongly relate to increased computer integration in foreign language instruction.

It has been twenty years since a nationwide study of this type and much in the realm of educational technology has changed. Although it is easy to disregard a message like this, please consider the importance of your department's participation. The results of this study will serve as a useful guide in the application of technology resources, leading to their greater and more efficient utilization.

Randomly selected from the nation's colleges and universities, the instructors in your department are requested to complete a brief (no more than 30 minutes) survey exploring the technology support of their use of computers in teaching. Please forward the information below to your faculty. They may complete the survey online or request a copy of it through the mail. Please encourage all of the foreign language instructors in your department who have opportunities to use computers in their language teaching to participate. Please include tenure-track faculty, adjuncts, and graduate teaching assistants.

As an incentive to participate, a $30 money order will be awarded to seven randomly selected individual survey respondents at the end of the data collection period. In addition, those completing the survey will be provided with a password to access an online display of the compiled results of the survey.

Thank you for your time and consideration.

Respectfully,

James T. Green
University of South Florida

==

A nationwide study investigating successful computer integration into college-level foreign language teaching is about to commence. Specifically, this study will examine how technology support relates to increased computer integration in foreign language instruction.

The foreign language instructors in your department are being asked to complete a brief survey about the support available when using computers in teaching. Your participation is important, even if you rarely use computers, because the results of this study will have the potential to improve the way your department supports the use of computers in the future. Of course, your participation is completely voluntary.

The survey should take less than 30 minutes of your time. As an incentive to participate, upon completion of the survey you may register to win one of seven $30 money orders to be given to randomly selected respondents at the end of the data collection period (limit one recipient per foreign language department).

You can respond to the survey in one of two ways:

1. Online: http://________

Click the link or copy and paste it into your Web browser. If you copy and paste the address, you may need to enter the following institutional code in the space provided on the first page of the survey:

INSTITUTIONAL CODE: ____________.

Appendix C (Continued)

**Please note*: The Institutional code is in NO WAY linked to you personally. When you respond to the survey, your answers will be completely anonymous. The Institutional code simply allows us to keep all responses from the same department grouped together for the final data analysis.

2. By Mail:
If you prefer a printed copy of the survey, click the following link (or copy and paste it into your Web browser) and provide the name and address to which a copy of the survey and a return envelope should be mailed. You may also reply to this message and enter the information below. Your contact information will be kept completely confidential and separate from your survey responses.

http://__________

Please, take a few minutes right now to respond to the survey. Your help is needed to discover the types of support that relate to successful computer integration in foreign language teaching. Once you complete the survey, you will be given the opportunity to register to win one of the seven $30 money orders to be awarded at the close of the data collection period.

Respectfully,

James T. Green
University of South Florida

[ ] I request a printed copy of the survey be mailed to me. I am providing my name and address for that purpose (type a letter "x" between the brackets to indicate your request).

Please send the survey to (Enter your information between the brackets):
Name:[ ]
Address Line 1:[ ]
Address Line 2:[ ]
Address Line 3:[ ]
City:[ ]
State:[ ] Zip Code:[ ]

Appendix D: Second E-mail Message to FL Instructors

Dear ___________:

Realizing in this day of overwhelming unsolicited email it is easy to disregard a message like this, please consider the importance of your participation in the nationwide study of technology support and computer integration in foreign language teaching. The results of this study have the potential to impact the way your department supports the use of technology in your teaching. Hopefully, it will lead to a greater and more efficient utilization of the technology resources available to you.

If you haven't done so already, please consider participating in this study as soon as possible. If you have already responded to the survey, thank you for your participation and contribution to the greater understanding of technology use in higher education. Of course, your participation is completely voluntary.

You may respond to the survey in one of two ways:

1. Online: http://________

Click the link or copy and paste it into your Web browser. If you copy and paste the address, you may need to enter the following institutional code in the space provided on the first page of the survey:

INSTITUTIONAL CODE: _____________.

**Please note*: The Institutional code is in NO WAY linked to you personally. When you respond to the survey, your answers will be completely anonymous. The Institutional code simply allows us to keep all responses from the same department grouped together for the final data analysis.

2. By Mail:
If you prefer a printed copy of the survey, click the following link (or copy and paste it into your Web browser) and provide the name and address to which a copy of the survey and a postage-paid return envelope should be mailed. You may also reply to this message and enter the information below. Your contact information will be kept completely confidential and separate from your survey responses.

http://_________

If you haven't already done so, please, take a few minutes right now to respond to the survey. Your input truly is needed in this study to discover the types of support that relate to successful computer integration in foreign language teaching. As a reminder, once you complete the survey, you will be given the opportunity to register to win one of the ten $25 money orders to be awarded at the close of the data collection period.

Respectfully,

James T. Green
University of South Florida

[ ] I request a printed copy of the survey be mailed to me. I am providing my name and address for that purpose (type a letter "x" between the brackets to indicate your request).

Please send the survey to (Enter your information between the brackets):
Name:[ ]
Address Line 1:[ ]
Address Line 2:[ ]
Address Line 3:[ ]
City:[ ]
State:[ ] Zip Code:[ ]

Appendix E: Correlations Among the Eight Items of the Computer Integration Index

Table E

Pearson Product-Moment Correlations Among the Eight Items of the Computer Integration Index (n = 150)

	Variables 1 - 14													
Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Word proc IN	--													
2. Word proc HW	.15	--												
3. Dsktop pub IN	.31**[a]	.16	--											
4. Desktop pub HW	.12	.24**	.70**	--										
5. MM prestn IN	.43**	.15	.41**	.30**	--									
6. MM prestn HW	.04	.41**	.34**	.38**	.33**	--								
7. Collab wrtng IN	.49**	.20*	.32**	.31**	.67**	.33**	--							
8. Collab wrtng HW	.23**	.34**	.30**	.30**	.36**	.48**	.54**	--						
9. Games, sims IN	.22**	.13	.31**	.29**	.37**	.31**	.56**	.34**	--					

Appendix E (Continued)

Table E (Continued)

	Variables 1 - 14													
Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
10. Games, sims HW	-.01	.20*	.18*	.20*	.08	.31**	.15	.32**	.40**	--				
11. Book CD IN	.31**	.27**	.16*	.09	.32**	.30**	.43**	.31**	.40**	.29**	--			
12. Book CD HW	.09	.27**	.03	.02	.13	.26**	.24**	.31**	.21*	.42**	.56**	--		
13. Drill n pract IN	.12	-.03	.26**	.14	.28**	.21**	.38**	.19*	.45**	.13	.44**	.24**	--	
14. Drill n pract HW	.14	.26**	.06	.10	.16*	.14	.19*	.22**	.21**	.43**	.37**	.53**	.28**	--
15. Integ skls tut IN	.17*[b]	.11	.25**	.19*	.36**	.22**	.44**	.39**	.37**	.10	.37**	.23**	.56**	.31**
16. Integ skls tut HW	.10	.26**	.20*	.27**	.30**	.22**	.37**	.37**	.27**	.31**	.38**	.51**	.34**	.56**
17. Disc skls tut IN	.19*	.09	.21**	.17*	.35**	.19*	.36**	.26**	.34**	.24**	.50**	.28**	.48**	.28**
18. Disc skls tut HW	.08	.25**	.10	.14	.18*	.15	.25**	.20*	.12	.37**	.34**	.42**	.18*	.53**

Appendix E (Continued)

Table E (Continued)

	Variables 1 - 14													
Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14
19. Email, chat IN	.45**	.18*	.39**	.23**	.64**	.30**	.59**	.35**	.35**	-.04	.26**	.09	.32**	.13
20. Email, chat HW	.14	.33**	.16	.16*	.17*	.36**	.27**	.44**	.21**	.17*	.15	.22**	.12	.08
21. Intnt resrch IN	.64**	.16	.27**	.04	.51**	.21*	.55**	.27**	.38**	.03	.43**	.19*	.35**	.16
22. Intnt resrch HW	.18*	.52**	.21*	.29**	.24**	.50**	.35**	.52**	.27**	.25**	.29**	.28**	.13	.19*
23. Intnt realia IN	.22**	.24**	.11	.07	.44**	.31**	.48**	.33**	.36**	.07	.39**	.24**	.25**	.16*
24. Intnt realia HW	.09	.46**	.19*	.19*	.33**	.43**	.40**	.50**	.31**	.34**	.39**	.50**	.22**	.36**
25. Webquests IN	.38**	.21*	.20*	.06	.33**	.20*	.47**	.41**	.30**	.06	.41**	.34**	.26**	.26**
26. Webquests HW	.23**	.26**	.17*	.11	.26**	.24**	.41**	.45**	.21*	.15	.30**	.30**	.19*	.22**
27. Make website IN	.38**	.11	.10	.01	.37**	.05	.25**	.17*	.07	.01	.24**	.22**	.06	.20*
28. Make website HW	.20*	.25**	.13	.15	.36**	.31**	.44**	.35**	.18*	-.04	.28**	.24**	.14	.19*

Appendix E (Continued)

Table E (Continued)

	Variables 15 - 28													
Variables	15	16	17	18	19	20	21	22	23	24	25	26	27	28
15. Integ skls tut IN	--													
16. Integ skls tut HW	.62**	--												
17. Disc skls tut IN	.68**	.46**	--											
18. Disc skls tut HW	.37**	.68**	.54**	--										
19. Email, chat IN	.40**	.29**	.20*	.12	--									
20. Email, chat HW	.19*	.21*	.15	.21*	.34**	--								
21. Intnt resrch IN	.39**	.21**	.43**	.17*	.66**	.29**	--							
22. Intnt resrch HW	.22**	.31**	.28**	.31**	.30**	.63**	.34**	--						
23. Intnt realia IN	.42**	.32**	.46**	.24**	.51**	.32**	.55**	.31**	--					

Appendix E (Continued)

Table E (Continued)

Variables	Variables 15 - 28													
	15	16	17	18	19	20	21	22	23	24	25	26	27	28
24. Intnt realia HW	.41**	.55**	.43**	.48**	.30**	.45**	.26**	.65**	.58**	--				
25. Webquests IN	.35**	.27**	.36**	.23**	.55**	.30**	.65**	.35**	.57**	.40**	--			
26. Webquests HW	.32**	.25**	.32**	.29**	.33**	.37**	.36**	.46**	.37**	.45**	.73**	--		
27. Make website IN	.20*	.24**	.25**	.29**	.47**	.23**	.47**	.20*	.34**	.28**	.53**	.35**	--	
28. Make website HW	.45**	.39**	.26**	.29**	.49**	.36**	.39**	.36**	.43**	.44**	.45**	.41**	.62**	--

Note. The variable names represent the following activities: Word proc = word processing; Desktop pub = desktop publishing; MM prestn = Creation of Multimedia Presentations; Collab wrtng = collaborative or group writing activities; Games, sims = using games or sim programs for language learning; Book CD = a cd that came with a textbook; Drill n prat = traditional drill and practice activities; Integ skls tut = Integrated skills (reading, writing, speaking, listening) language learning software; Email, chat = using email or chat for language learning activates; Intnt resrch = using the Internet for research; Intnt realia = using the Internet for authentic language material; Webquests = using the Internet to complete Make website = creating websites for or about FL learning.
$^{a}p < .01$ **, $^{b}p < .05$*

ABOUT THE AUTHOR

James T. Green was born in Ft. Lauderdale, Florida and earned a B.A. Degree in Bible from Florida Christian College, an M.Div in Apologetics from Cincinnati Christian University, and an M.A. in Applied Linguistics from the University of South Florida. He was a Minister in the Christian Church/Church of Christ from 1980-1994, and continues to practice ministry in all aspects of his life today. He first travelled to Japan during the summer of 1982 to work with missionaries and it was then that he discovered joy in working with international students teaching English as a Second/Foreign language. Since that summer, he has returned to Japan numerous times and has continually worked in the field of ESOL in some capacity both in the United States and abroad.