COMPUTER TECHNOLOGY INTEGRATION
IN CYPRUS ELEMENTARY SCHOOLS

A Thesis in
Educational Leadership

by

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ABSTRACT

The purpose of this study is to evaluate the current situation in Cyprus elementary classrooms regarding computer technology integration. The study examined how Cypriot elementary teachers use computers, and the factors that inhibit or promote computer integration in their classroom practices. To address the research questions that guided the study, an evaluative case study design was applied. It employed a mixed method approach through the usage of structured questionnaires and semi-structured, open-ended interviews as the major methods of data collection. Quantitative and qualitative data gathered from a sample of Cypriot teachers in which high, moderate, and low computer use teachers were identified. The existing literature served as the basis of this project. It guided the investigator to design, develop and implement the study’s conceptual framework, questionnaire and interview protocols.

Computer integration in education has been examined by various researchers. It has been of great interest and concern worldwide. Thus, the value of the proposed study lies in its potential to help policymakers, educators, and other stakeholders that have the power to take decisions and design policies, to gain understanding on two major parameters related to computer integration: 1) how computers are used by teachers and students in the classroom, and 2) the factors that influence computer integration in the classroom. In addition, the study aims to provide information to help researchers, policymakers, and educators to address other issues related to computer integration in schools such as; if computer technology makes a difference in the classroom settings, if is it feasible to integrate computers as a regular classroom features, and many more.
The results of the quantitative analysis indicated that while Cypriot teachers use computers rather extensively for their own purposes, they use them less frequently in their classes. When they do use them in their classes, it tends to be in a rather sporadic fashion, more as “extras” or fancy chalkboards than as true learning tools. Few teachers were found to use computers in any sort of constructivist or progressive way. Regression analysis revealed that teachers’ education, school climate, teachers’ professional behavior, and teachers’ attitudes towards the use of computers in education, were significant predictors for classroom computer use.

The results of the qualitative analysis summarize the factors that influence teachers in applying computers in their classroom practices. A general uniformity across the three categories of teachers revealed, in terms of the factors that function as barriers in applying computers in the classrooms. The factors can be summarized as follows: 1) lack of resources, 2) the tyranny of the curriculum, 3) incomplete and inadequate professional development training, 4) lack of guidance, support, and incentives from the officials, and 5) other factors, including technical problems, students’ computer literacy level, etc.

Along the same lines, a general uniformity across the three categories of teachers revealed in terms of the factors that facilitated them to apply computers in their classroom practices. These factors are summarized as follows: teachers’ computer literacy; teachers’ education beyond bachelor in fields related to computer technology; teachers’ training through their college program of studies regarding computer skills, and integration of computers as tools in their contexts; the support of their schools PTAs; the help from the district coordinator; the professional
development training organized by the Ministry of Education; their beliefs that the computer is an extremely important tool for students to possess; and last but not least their instructional philosophies.

At the end, the study provides a discussion of the results, implications for policymakers and educators, as well as questions for further study.
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CHAPTER 1 - INTRODUCTION

Statement of the Problem

In recent years the impact of the “information age” has shifted from occurring primarily within the arena of governments and multinational corporations into the everyday lives of average people throughout the world. Accompanying this expansion is a growing belief among the general public that computers are essential components of the educational and instructional systems. According to many researchers (Dwyer, Ringstaff, & Sandholtz, 1996; Goddard, 2002; Haugland, 2000; Honey, 2001; Polonoli, 2001), such public perception is warranted because the computer represents not only an excellent curricular tool, but also a revolutionary classroom approach that can help students achieve important gains in learning and understanding.

The trend is not confined to highly advanced societies. School systems in small nations are also increasingly viewing the computer as a powerful and realistic tool for the classroom. For example, Cyprus has begun designing new policies and investing large sums of capital aimed at integrating computers into its classrooms. An attempt to integrate computers into Cyprus elementary classrooms began in 2000, through a five-year plan, called “Evagoras.” The Information-Age requires knowing how to manipulate information (Reich, 1991), and the economy in Cyprus is based on information. The major sources of income come from services such as tourism, banking, accountancy and consulting. Consequently, Cyprus’s educational leaders increasingly consider knowledge and skill in computer technology to be essential.

However, questions exist as to whether or not classroom teachers throughout the world, and particularly in Cyprus, possess the knowledge, skills, and attitudes
needed to successfully and effectively implement the technologically oriented policies
and resources in ways that are helpful and valuable to students. Even though
Ministries of Education around the world are spending enormous amounts of money
in order to promote and support computer technology in their practices, do teachers
take advantage of computer technology? Is computer technology actually a valuable
tool in the teaching and learning process? Do teachers integrate computers in ways
that transform their classroom computer from primarily a record keeping, reference,
or intelligent tutoring tool, into one that can fundamentally alter the way they teach
and the way their students learn? In addition, even if teachers possess a reasonable
level of technological literacy and even if they use computer applications frequently
in their classrooms, the question remains as to whether they use computers in ways
that truly reform and revolutionize classroom instruction, or simply to reinforce and
support more traditional practices. Do they use computer technology as a tool to
promote teaching and learning or do they use it for games, enhancement activities or
as a remedial tool? Such tension often surrounds the implementation of instructional
technologies (Cuban, 2001) and it is the key focus of this study.

Purpose of the Study

Using Cyprus as an example of a nation in which this kind of tension exists,
this study employs a mixed method approach (qualitative and quantitative analysis) in
order to evaluate the current situation in the Cyprus educational system in terms of
computer technology integration. It attempts to investigate and assess the level of
computer usage (frequency), and kind of computer usage (various types of computer
uses). It also aims to identify and gain understanding of various factors such as
personal, professional and organizational ones that lead and guide teachers in their efforts to integrate computers in their classroom practices. Furthermore, the goal of the proposed study is to evaluate the quality and efficacy of computer technology integration in Cyprus elementary schools. In other words, it examines how useful and valuable tool computer technology is to teachers and students, and how they use it to promote students’ learning, performance, and achievement. Based on conceptual frameworks described in previous literature, as well as on my own conceptualization, the study will seek to answer the following:

- How do teachers and students in Cyprus elementary schools apply computer technology in the classroom?
- What are the factors that influence teachers in integrating computer technology into their classroom practices in Cyprus elementary schools?

To address these questions, the study applied an evaluative case study design and employed a mixed method approach through the usage of structured questionnaires and semi-structured, open-ended interviews as the major methods of data collection. These two methods have been selected as the most appropriate based on the purpose of the study. The proposed questionnaire and interview protocols are further discussed in Chapter Three and are presented in Appendices D, E1 and E2.

**Justification of the Study**

The study addresses an important and crucial issue for the Cyprus Educational system, as well as for other educational systems that integrated or planning to integrate computer technology in their practices. The significance of the study lies in
its implications for policymakers, educators and other school stakeholders. Decision makers need to possess realistic information regarding the application of computers in the schools; which can be gained from the evaluation of computer application in different educational systems. These research questions have important policy implications regarding the increasing application of computer technology in schools. The findings of the proposed study should assist decision makers to evaluate the outcomes of computer integration in the schools.

Along the same lines with the above, by evaluating the level and kind of computer integration, and by identifying teacher and school characteristics associated with computer technology integration, this study aims to provide insight and valuable information for the Cyprus Ministry of Education. This information will be useful in developing policies to effectively integrate computer instruction into the nation’s elementary schools. Moreover, it attempts to understand and explain how computers are used in classrooms, by teachers and students, as well as why they use them the way they do. Based on the above, the results of the study have important policy and practical implications regarding the future use of computer technology in Cyprus elementary schools.

In addition, the study should fill a critical evaluation gap for the Ministry of Education. Specifically, since the beginning of the Evagoras project, the Ministry of Education has not carried out any empirical study to examine teachers’ practices, feelings, behaviors, knowledge and abilities. Furthermore, it has not gathered any baseline data with respect to the way teachers actually integrate computers in their classrooms, for example, whether teachers use computers as fundamental tools for
teaching and learning or mainly for enhancement activities. Given the lack of baseline data, the Ministry of Education officials cannot effectively control and administer the use of computer technology in elementary schools.

Besides the above, the study expects to contribute to the existing literature related to computer technology integration. The results of the study have practical and policy implications besides the Cyprus educational context. It is really important to evaluate computer technology integration in different educational systems, in different countries. The examination of how computers are applied in the classrooms, and the factors that influence computer application, have been of great interest and concern worldwide. The investigation by numerous researchers, in different settings, and from various perspectives, builds up the knowledge related to computer integration. In other words, it contributes to the existing literature and provides valuable information that facilitates investigation of other issues related to computer integration. Further investigation helps to address in depth a variety of serious questions and dilemmas. For example, does computer technology makes a difference in the classroom settings? Does more computer technology mean more student academic improvement? Is it feasible to integrate computers as a regular classroom features? Are there any ways to effectively integrate technology into the classroom setting, children’s learning, and the curriculum? The above questions are very intriguing and constantly concern researchers, policymakers, and educators.

Thus, the value of the proposed study lies in its potential to help policymakers, educators, and other school stakeholders that have the power to take decisions and design policies, to gain understanding on two major parameters related
to computer integration: 1) how computers are used by teachers and students in the classroom, and 2) the factors that influence computer integration in the classrooms.
CHAPTER 2 – BACKGROUND/ LITERATURE REVIEW

Introduction

Computers (occasionally referred to here and elsewhere as “technology”) are used in all facets of education. Ministries of Education are spending enormous amounts of money to support and promote computer integration into classrooms. According to one study, for example, in the year 2000 alone, $5.7 billion was spent on technology in American schools (Doherty & Orlofsky, 2000). Many argue, however, that supplying schools with ample technology is unlikely to produce any substantial change in core instructional technology. For example, Cuban (2000; 2001) argues that computers do not play a significant role in teachers’ instructional practices and play only a minor role in students’ academic learning. The reason, he suggests, is that computer instruction is largely incompatible with the requirements of teaching. He suggests that it is simply quite hard to incorporate computers as regular features of classroom activities. Cuban sees the main value of computers as being primarily symbolic for schools, that they signal “quality” to parents and community members (Cuban, 1986; 2001).

Becker and Ravitz (2001) contend, however, that while Cuban’s predictions may be statistically correct, he underestimates the implications regarding the role that computers will play over the next decade. They conclude that Cuban’s assertions of minimal impact are likely to be out of date in the near future. Is it possible, though, that Cuban’s critics have underestimated the power of traditional organizational structures in schools to limit or rechannel the effectiveness of new forms of
educational technology? One study (Zhu, 2003), for example, found that American teachers even in “technology rich” schools seldom used computers in any real integrated way in their classrooms. Cuban’s argument appears to be supported by this finding and would receive more support should the present study reach similar results among the Cypriot teachers. On the other hand, should the present study find characteristics among teachers and schools related to using computers as something more than expensive high tech chalkboards, it would support the arguments of Cuban’s critics.

Factors That Influence Teachers in Using Computer Technology in Their Classroom Practices

Studies reveal how many interacting factors influence teachers in integrating computers in a meaningful, fruitful and progressive way into their professional context. This part of the paper examines those factors revealed in the literature and presents in detail the conditions, and environments that support and promote the use of computer applications in the classrooms. The above examination helps the investigator to understand and explain the level (frequency) and kind of computer use by the teachers and students.

The literature separates those factors in two major categories external and internal to teachers. Otherwise, external factors are called first-order, and internal factors are called second-order (Ertmer, 1999). Ertmer, points out that “even if all first-order factors that function as barriers were removed, teachers would not automatically use technology” (p. 57). The existence of the second order factors, that are intrinsic to teachers, is extremely important and directly influence teachers’
decisions regarding computer integration. Appendix A summarizes the two groups of factors.

**Factors External to Teachers**

Successful computer technology integration into classrooms requires the continuous and adequate professional development and training of teachers (Becker & Ravitz, 2001; Byrom, 1998; Carvin, 1999; Dexter, et al., 1999). Studies suggest that teachers’ training needs to go beyond simple computer skills such as word-processing, spreadsheets, presentation and multimedia programs. More important than simply learning how to use computers, is professional development in computer curriculum-integration. Finally, many researchers (Becker & Ravitz, 2001; Carvin, 1999; Earle, 2002; Honey, 2001; Jerald, & Orlofsky, 2001; McKenzie, 2001) suggest that teachers who had received both kinds of training (basic computer skills and technology integration) are likely to feel more prepared and comfortable to integrate computers in their classroom practices.

The same reasoning applies to pre-service teachers. The studies cited above indicate that teachers need to have both kinds of training during their college preparation years. Teachers, who experienced this kind of training and practice in college classes and internships, are more likely to use computer applications in an integrated fashion in their classroom activities.

Byrom (1998), emphasizes the importance of leadership, arguing that it is the key point to successful technology integration. Along the same lines, Meyer (2001) reports that administrative support is critical in encouraging teachers to adopt technology into their instructional practices. He also states that even though
administrative support might be ranked last in significance based on teachers’ priorities, it is extremely important for successful computer integration and it can influence other important factors in the process.

In a study in which teachers and principals were asked to discuss barriers to technology use, they have reported the same barriers but in a different order. They included the following: insufficient teacher understanding of methods for integrating technology into the curriculum; insufficient number of computers; lack of software integrated into the curriculum; and insufficient technical support (Education Week, 1999, p. 62). Along the same lines, other studies indicate other important factors including a positive school environment, adequate school support, adequate technology resources, access to hardware and software, basic technological equipment and facilities, technical support and technical assistants, time for planning, teachers’ coaching, appropriate teacher evaluation, and sustained funding for technology (Becker & Ravitz, 2001; Byrom, 1998; Cuban & Pea, 1998; Dexter, et al., 1999; Duffield, 1997; Earle, 2002; Ertmer, 1999; Gahala, 2001; Honey, 2001; Means & Olson, 1993; Sheingold and Hadley, 1990).

**Factors Internal to Teachers**

Factors internal to teachers, otherwise called, second-order factors, include teachers’ personal beliefs; their traditions and philosophies about teaching, learning and computer applications in classrooms; their beliefs about the effect of computer usage on students’ learning and performance; their instructional practices; their level of resistance and passivity with respect to change; and their school’s culture and social environment (Earle, 2002; Ertmer, 1999; Cuban & Pea, 1998).
Researchers (Becker & Ravitz, 2001; Becker & Reil, 2000; Carvin, 1999; Dexter et al., 1999) argue that teachers’ instructional styles, their attitudes towards learning, their teaching philosophies as well as their beliefs on how students learn, influence the way computers are integrated in the classroom. One factor of particular interest is teachers’ personal association with constructivist techniques. Teachers whose philosophies favor constructivist-oriented teaching practices are more likely to integrate computers in their classrooms in a substantial and intellectually fruitful way. When teachers use student-centered learning techniques, promote construction instead of instruction in their classrooms, consider themselves constructivist, as well as promote face-to-face interactivity and collaboration among the students, are more likely to use computer applications in their classrooms and promote meaningful computer integration.

Constructivism views that knowledge is not “about” the world, but rather “constitutive” of the world. Constructivist theory of learning acknowledges that individuals are active agents, they engage in their own knowledge construction by integrating new information into their schema, and by associating and representing it into a meaningful way. Also, constructivist approach to learning emphasizes authentic, challenging projects that include students, teachers and experts in the learning community.

In addition to the above, teachers who put value on socially mediated learning may be more likely to maintain goals related to the development of students’ high order thinking skills and capabilities. They may also utilize a number of practices that encourage the attainment of such goals. For example, such teachers may be more
likely to use creative strategies that make learning more meaningful to students. They may tend to highlight innovative interdisciplinary themes that link course content to students’ interests. Such teachers are more likely to use collaborative learning arrangements and cooperative peer assessment. Behaviors like that appear to be more in line with the use of computers as integrative mindtools in the classroom (Carvin, 1999; Dexter, et al., 1999; Jonassen, 1999b). If teachers apply traditional methods of teaching, following a more teacher-centered approach it becomes more difficult for them to consider using computers progressively into their classrooms.

Certain types of teachers’ characteristics may also shape behavior. Specifically, Becker and Ravitz (2001) contend that teachers who find opportunities for professional engagement (are active in their profession, take on responsibilities in their schools, participate in committees, attend workshops, take leadership roles, etc.) are more likely to integrate computers in their classrooms. Finally, Dexter, et al., (1999) mention that teachers who easily accept and incorporate new ideas, changes and reforms into their practices are more likely to integrate computer applications in their teaching.

Furthermore, teachers’ interactions with peers may also shape behavior. Teachers who maintain more frequent personal and professional contacts (increased communication and relationship) with their peers may be more likely to encourage students in similar ways through the use of computer applications (Berg, et al., 1998; Carvin, 1999; Dexter, et al., 1999).

In addition to these kinds of professional qualities, there is a number of personal characteristics that may influence how teachers use computer applications in
their classrooms. The teacher’s own learning style is certainly one such factor. For example, if he/ she himself/ herself is a creative thinker who likes the idea of constructing knowledge, is a life-long learner, a social learner, and a decision maker, he/ she may be more likely to use computers in more integrative and transformational ways that are useful and valuable to students instead of ways that promote and support traditional classroom practices (Bielaczyc & Collins, 1999; Carvin, 1999). An additional element given by Carvin (1999), is age. He contends that younger teachers are more likely to apply computers in their classrooms instead of older teachers. Finally, teachers who feel that computers are good tools for promoting students’ learning are also found to engage their students in using computers more than teachers who did not feel that way.

**Further Evidence: Studies of Exemplary and Non-exemplary Teacher Computer Users**

Another “family” of studies that focuses on the differences between exemplary or expert computer users and non-exemplary or non-expert computer users helps to reinforce many of the conclusions and speculations discussed above. Becker (2000), for example investigated the differences between “exemplary” and “non-exemplary” teacher computer users regarding their beliefs, backgrounds, philosophy of education and the characteristics of their working environment. He summarizes that exemplary computer users can be found in school environments with social networks of computer-using teachers as well as in schools that maintain organized support in the form of staff development activities and a full-time computer coordinator.
This means that in schools where administrators’ ideas about using computers go beyond simple keyboarding and word-processing skills, the possibility that teachers will use computers in exemplary ways increases. In addition to the above, Becker concludes that highly effective or “exemplary” technology teachers had accumulated more credits and degrees, had been personally using technology for longer periods of time, and had participated in more training and workshops dedicated to technology integration. Also, Becker (1993), cited in Berg et al. (1998), concludes that expert technology teachers are related to the “exercise mode” where technology is used for problem solving, instead of the “productive mode”, where technology is used for drill and practice. In another study, Becker and Ravitz (2001), argue that if teachers are themselves exemplary computer-users, the possibility of using computer applications in their classrooms, is high.

In a study a decade earlier, conducted by Honey and Moeller (1990), teachers were identified as “high-tech” and “low-tech”. Interestingly enough, despite the fact that “high-tech” teachers have participated in different kinds of professional development and received different types and amounts of training, most of them were self-taught, highly motivated, and eager to learn new technologies that would change the way they teach and enhance students’ learning and achievement. This group of teachers tended to cite administrative and district support as important. In addition, these teachers were more likely to use computers for personal and professional work. The group of “low-tech” teachers supported that technology should not be as “deeply integrated into the curriculum” (p.10), but that it was better to use technology as special treat rather than enhancement to education.
Goddard (2002) argues that the Information Age has created a cultural, historical, and social need for technology integration in increasing students’ abilities, self-directed learning, critical thinking, mental functioning, and decision making skills. Goddard’s argument calls upon students to go beyond computer literacy, drill, and practice and for educators to find ways to integrate computer applications in classrooms in far more transformational ways than currently exist.

Besides examining the factors that influence teachers in integrating computers into their classrooms, it is also important to investigate how teachers are currently using computers in their classrooms. Throughout the literature and over the past decades, differential practices in educational computers have been identified and described. Since one of the key tasks of the present study is to examine the level, and the kind of computer usage in classrooms, as well as how useful and valuable computer use is to teachers and students, it is important to discuss these practices and delineate different examples given in the literature on how teachers integrate computers in their classrooms.

The researcher suggests that the “traditional / transformational” dichotomy runs as an implicit theme throughout earlier literature and remains a useful way of understanding and discerning between different approaches to practice. It helps us examine the different types of computer activities that teachers use in their classrooms. This section, therefore, presents definitions, delineates the characteristics of the two approaches, and attempts to present different computer usages related to classroom activities. A good way to begin thinking about this dichotomy is to
consider and compare how computers are used, and what they aim to achieve in terms of knowledge and abilities (i.e., lower and higher order skills). This kind of thinking help us derive different examples of how computers are used within the two trends: traditional and progressive.

**Traditional**

Although the use of computers in schools may have often been viewed as highly innovative and progressive throughout the 1960’s, the term “traditional” is probably a better term to describe the practices typically found in most schools over the past four decades. This period is mainly characterized by what some literature refers to as “learning from” computers. Learning from computers, includes activities such as Computer Assisted Instruction (CAI) and Computer-Managed Instruction (CMI), intended to help students acquire basic skills. Computers are thus viewed as tools programmed to teach students and to direct their activities towards the acquisition of pre-specified knowledge or skills. Drill and practice are emphasized, as well as the acquisition of “lower levels” of learning such as knowledge and comprehension. The most prominent forms of CAI/CMI were tutorials, games and intelligent tutoring systems (CTGV, 2003; Cuban, 1986; Cuban & Pea, 1998; Jonassen, 1999a; Kulik, et al., 1991; Molnar, 1997; Pea, 1985; Roblyer, Edward, & Havriluk, 1997; Trotter, 1998).

A second category of practice traditionally used in American schools can be called “learning about” computers (Becker, 1993; Cuban & Pea, 1998; Jonassen, 1999a; Molnar, 1997; Pea, 1985). Activities included in this category focus on increasing student computer literacy. For example, during the late 1960’s and early
1970’s, many high school math and business departments included enhancement or regular activities that involved punch card programming. With the advent of the microcomputer, the trend continued into the 1980’s in the form of more sophisticated forms of programming (Basic, Cobalt, etc.). The current form of the trend seems more frequently revealed in school classes aimed at teaching students about word processing, “keyboarding,” and various hardware and software usages.

Becker (2000), reports that the most common uses of computers in schools have been for supporting traditional skills and fact-oriented instruction. Teacher-centered classroom, transfer of knowledge, the development of lower order skills such as knowledge, comprehension, and individual learning are related to the traditional computer application practices (CTGV, 2003; Hanaffin, Land, & Oliver, 1999; Jonassen, 1999a; Pea, 1985; Salomon, 1990; Salomon, et al., 1991).

Based on Bloom’s taxonomy (1956), knowledge and comprehension are considered as basic skills or lower level skills since they involve recall or basic understanding of the content. Students use drill and practice courseware as a way of learning new concepts, correct procedures, and facts. In addition to the above, simple, linear tutorial programs are also used for developing basic skills (Roblyer, et al., 1997). Traditionally computes were used to provide enrichment activities, rewards or treats for good performance, good behavior or even as a remedial tool (Manzo, 2001).

**Progressive**

Progressive, authentic or transformational computer uses represent the second major trend of educational computing. *Learning with* computers and effects of computer use characterizes this trend. *Learning with* requires integrating computers
as mindtools in the classrooms to support constructive learning. Educators embed or apply computer capacity in the context of ongoing teaching and learning in different school subjects. Based on the above, students learn how to use the computer applications not as an end in themselves, but as tools that help them execute their tasks and promote the balanced development of their mental abilities. As a result they do not learn from technology, but technologies support meaning generated by students. (Becker, 1993; Becker & Ravitz, 2001; Bielaczyc & Collins, 1999; Carvin, 1999; CTGV, 2003; Cuban & Pea, 1998; Dexter, et al., 1999; Earle, 2002; Haugland, 2000; Jonassen, 1999a, 1999b; Pieters, 2001; Salomon, et al., 1991).

Effects of computer use aims to transfer knowledge and skills after using the computer. Pea (1985) and Salomon (1990), refer to this as cognitive residue; that is, the enrichment of students’ skills and knowledge. Cognitive residue is achieved by the interaction with the computer application through performing an assignment. A result of the interaction is the ability to manifest the knowledge and skills acquired beyond the context in which they have been acquired or developed.

According to Dexter, et al., (1999) when technology is used in progressive ways it “...supports active learning; it becomes a tool with which the students construct knowledge” (p. 56). Computers also serve as the means to promote higher order and critical thinking as well as reorganize students’ mental functioning and transcend the limitations of the mind (Pea, 1985). Along the same lines, Salomon, et al., (1991) state that: “… computer technologies that aid in cognitive processing, can support intellectual performance and enrich individuals’ minds”. Another definition provided by Jonassen (1999a), successfully captures the essence of computers as
mindtools. He writes “Mindtools are computer-based tools and learning environments that have been adapted or developed to function as intellectual partners with the learner in order to engage and facilitate higher order thinking and learning” (p. 10).

Based on Bloom’s taxonomy (1956) analysis, evaluation, and synthesis represent higher-level learning objectives. The studies cited above suggest that these higher level objectives can be more effectively achieved through the applications of computer technology. In addition, computer technology helps educators develop collaborative, active and authentic learning environments as well as promote critical thinking, problem-solving and increased interactivity among students.

Barron and Goldman (1994) and Collins (1991) conclude that students with extensive access to computers learn how to organize complex information, recognize patterns, draw inferences, and communicate findings. Jonassen (1999a), also mentions that teachers can achieve higher-order learning when using computer applications for activities such as evaluating, analyzing and connecting information by using a database or spreadsheet; elaborating, synthesizing and imaging by using semantic networking tools or expert systems tools; problem-solving, decision making, or reflecting on their work with peers by using computer mediated communications tools, such as e-mail, bulletin boards, or listserves. Finally, Becker (2000) mentions that computer applications such as learning and teaching tools, is the medium to achieve social learning, construct knowledge, student-centered classroom practices, and higher order skills.
Cyprus Ministry of Education and Evagoras

As mentioned earlier, an attempt to integrate computers in Cyprus elementary classrooms started in 2000 through a five-year plan called Evagoras. The immediate need for computer technology integration in education is the major force that guided the development of the Evagoras project. Others, are the island’s accession into the European Union in the Spring of 2004; economic, educational, and national reasons; and last but not least, the experience of other countries such as the United States, Sweden, Israel and Finland. The philosophy of the project relies on the fact that students should not learn how to use the computer applications as an end in themselves but learn how to use them as tools that help them to execute their tasks and projects (District Curriculum Developers and Evagoras team, 1999).

Evagoras has five portals: 1) the update of the national curriculum that will include computer technology applications; 2) teachers’ professional development in three levels: computer literacy, use computer applications as teaching and learning tools, and use of other technological methods and mediums; 3) using computers for school management; 4) integrate Internet applications in the elementary education, and 5) increasing the amount of hardware, software support, and maintenance within schools (District Curriculum Developers and Evagoras team, 1999).

The Cyprus Educational System, like many other school systems throughout the world, is increasingly turning to classroom computer technology as a means to fundamentally transform the way it delivers curriculum and instruction to their students. And yet, the often overlooked question is whether teachers possess the attitudes, knowledge, and ability necessary to transform the classroom computer; that
is, to convert it from primarily a record keeping, reference, productivity, or intelligent tutoring tool (ways that maintain, facilitate, or enhance more traditional approaches) into one that will fundamentally alter the way teachers teach and students learn. Up to this time, however, there has been no clear evaluation either of schools specific needs or of the way schools are currently using the computers they have.

**Conceptual Framework**

**Introduction**

Maxwell (1996), mentions that experience, prior theory and research, pilot study and experiments, are the four major sources of a proposal’s conceptual framework. The existing literature served as the basis of this project. It guided the investigator to design, develop and implement the study’s conceptual framework, questionnaire and interview protocols, in order to fully address its research questions.

The goal of the study is to examine the level (frequency), and kind of computer usage (how computers are used). In addition, it seeks to investigate the factors that influence teachers in integrating computers in their classroom practices. The study proposes that different groups of factors such as personal, professional and organizational, guide teachers in integrating computer technology in their classrooms. Finally, those factors will contribute to the understanding and explanation of the level, and kind of computer usage in Cyprus Elementary classrooms (See Appendix B - Conceptual Framework Diagram).
Factors that Influence Teachers in Integrating Computer Technology into their Classroom Practices

The first part of the proposed conceptual framework focuses on the factors that according to the literature appear to influence teachers’ practices regarding computer technology integration. Instead of using the distinction made in the literature of first and second order factors, the researcher reorganized those factors into three major categories: personal, professional, and organizational. The second category, professional, is further distinguished into experience, professional development, and philosophies/instructional practices. The author decided that the above three categories widely used in educational and sociology research are more appropriate for the study’s context – Cyprus elementary schools. In addition, these three categories of factors will help us better explain and understand the level and kind of teachers’ computer usage for instructional purposes (See Appendix C).

Teachers’ Practices in Terms of Computer Technology Integration

The study suggests that the above categories of factors influence teachers’ practices in terms of computer technology integration. Basically, the following parameters related to computer technology integration are: 1) level of computer usage, 2) and kinds of computer usage (various types).

The first parameter, level of computer usage, describes the frequency of computer usage in Cyprus elementary schools: how often (how much) teachers use computer technology in their classroom practices. The second parameter, kinds of computer usage, portrays the ways that computer technology is integrated into classroom practices (how teachers integrate computers). Current research provides various examples of how computers are used in classroom practices that are described
by the traditional/progressive dichotomy presented in a previous section of this Chapter.

**Research Questions**

All the above bring us to the major goal of the study, that is to evaluate computer technology integration in Cyprus elementary schools by investigating factors that influence computer technology in the classroom. In other words, the study examines how these factors influences the level and kind of computer use. As previously presented, the following research questions were of primary interest and guided this study:

- **How do teachers and students in Cyprus elementary schools apply computer technology in the classroom?**
  - Does the dichotomy of traditional (common)/transformational computer uses apply (is apparent) to the context of Cyprus elementary schools?
  - Do teachers and students apply computers in ways that fundamentally transform and revolutionize education?

- **What are the factors that influence teachers in integrating computer technology into their classroom practices in Cyprus elementary schools?**
  - How do these factors help us understand and explain the level (frequency) of computer usage in Cyprus elementary schools?
  - How do these factors help us understand and explain the kind of computer usage (various types of computer usage) in Cyprus elementary schools?
The researcher expects to find out that Cypriot teachers use computers in their classroom through a variety of educational practices. Those practices should be able to be categorized under the traditional and transformational categories. The researcher believes that the traditional approach will appear to be the most frequently applied computer use in the Cyprus educational context. She also anticipates that teachers that apply computers transformationally in their classroom practices will be revealed. Although, she does not know in what frequency, what degree, and if teachers apply them in ways that can fundamentally transform and revolutionize education.

Regarding the factors that influence computer technology integration, the researcher expects to find out that a combination of factors influence computer technology integration in the classrooms. Factors given by the existing literature will be applied as well in the Cyprus educational system. Additionally, the researcher believes that a variety of other factors that influence teachers in terms of computer integration in their classrooms will be revealed because of the system’s individualities and culture. The researcher expects that the above factors, will shed light and provide valuable and useful information to understand and explain the current situation in Cyprus educational system.

To conclude, I would like to mention that the significance of the proposed study lies in it its implications for policymakers, educators, parents, and the community, as well as its potential to help the above groups of stakeholders to gain understanding regarding computer usage in Cyprus elementary schools, and plan the next steps needed to be taken in order to successfully apply computer technology in the system.
CHAPTER 3 – METHODOLOGY

Design of the study

Taking into consideration the purpose of the study as well as the research questions, the investigator decided that the best design to employ in order to conduct the proposed study is case study. As Yin (1994) mentions case study is one of several ways of doing social science research. It is preferable to use case study strategy when the following conditions exist: 1) “how” and “why” questions are being posed, 2) when the investigator has little control over events and finally 3) when the focus is on a contemporary phenomenon within some real-life context (p. 6). Along the same lines with Yin, Merriam (1988) mentions that the case study approach seeks to provide explanation of real world situations, it explores processes and dynamics of practice and provides useful insights into educational practice that proved helpful in forming policy. Also, a case study approach is the best methodology of addressing problems in which understanding is sought in order to improve practice (Merriam, 1988). Finally, Cuba and Lincoln (1981) mention that case study provides an intensive and complete explanation of a facet, person, or issue, illuminating meaning and communicating understanding.

One of the major five applications of case study research is explanatory or causal case studies. Based on the U.S. General Accounting Office (1990) as cited in Yin (1994), from the evaluation perspective, this application provides explanations
that would link program implementation with program effects. Merriam (1988) mentions that description, explanation, and judgment are important characteristics of the evaluative case studies. Also, Merriam (1988) supports that case study “is a good mean of educational evaluation because of its ability to explain” (p. 28).

Most of the conditions mentioned above are met in the case of this study. It seems that the various characteristics of case study research fit well with the proposed study. It seeks to evaluate and examine a specific, contemporary phenomenon, which in this case is computer technology integration in Cyprus elementary schools. Also, it attempts to explain and understand the specific phenomenon through examining the level and kinds of computer usage, as well as the factors that influence teachers in integrating computers in their classroom practices. It attempts to evaluate the quality and efficacy – the effects, results – of the implementation of the project that aims to introduce computers in Cyprus schools. Case study research seems to be the most appropriate technique to apply based on the study’s purpose and research questions.

Yin (1994) supports that case study inquiry “relies on multiple sources of evidence, with data needing to converge in a triangulation fashion” (p. 13). Case studies can be based on any mix of quantitative and qualitative evidence. Specifically, Patton (1988) mentions that one approach of achieving methodological mixes is through methodological triangulation. Methodological triangulation is explained as “the use of multiple methods to study a single problem or program” (p. 109). Since triangulation employs multiple strategies, it is an important approach for conducting evaluation research. Based on the above, the researcher employs a mixed method approach in order to address the study’s research questions.
Along the same lines, based on Creswell (2002) the best mixed method approach to use in order to address the study’s purpose is the Sequential explanatory strategy. He writes “It is the most straightforward approach” (p. 215). First the quantitative data are collected and analyzed and then qualitative data collection and analysis follows. The two methods are integrated during the interpretation phase of the study. The purpose of this mixed method is to use “qualitative results to assist in explaining, interpreting and further examining the findings of the quantitative study” (p. 215). Finally, Merriam (1988) mentions “ a case study can explain theory or build theory, incorporate random or purposive sampling, and include qualitative and quantitative data” (p. 2).

Based on the above, the study through the application of the sequential explanatory strategy, contains a quantitative as well as a qualitative component. The quantitative component consists of a survey administered to a sample of Cypriot elementary school teachers. The qualitative component consists of a series of semi-structured interviews with a sub-sample of those teachers surveyed. The survey was developed based on the conceptual and empirical relationships discussed in Chapter Two. It intended to help identify the level (the frequency) and the kind (various types) of computer use in Cyprus elementary schools, as well as reveal factors that may be associated with teachers’ practices related to computer technology integration into their classrooms. Teachers’ practices regarding computer technology integration is a combination of different interrelated factors that can be better understood and explored through a quantitative inquiry. Basically, the quantitative inquiry addresses questions of “how”, “what” as well as “how much” (Patton, 1988; Yin, 1994). For
example, how much computer technology is used, how it is used, what kinds of activities teachers assign to students when applying computers in the classroom and what factors influence teachers in applying computer technology in their classroom practices.

The subsequent interview protocols, also based on the arguments presented in Chapter Two, aimed at providing a deeper level of data that were used to evaluate, confirm, complement and/or better understand the survey findings. The qualitative research was employed to make judgments about the meaning and importance of the study’s lines of inquiry (Merriam, 1998; Rist, 1982): computer usage and factors that influence computer usage. Moreover, it helped the researcher elicit richer empirical data, and investigate in depth phenomena such as the teachers’ instructional philosophies, their opinions about the current situation in Cyprus elementary schools regarding computer technology integration, their perceptions, behaviors, and attitudes (Harchar & Hyle, 1996) towards computer technology in schools. Additionally, the interviews revealed factors that influence teachers in applying computers in their classrooms besides the ones mentioned in the literature. The factors revealed through the interviews are related to the phenomenon (computer technology integration in Cyprus elementary schools) that is under investigation. As Kvale mentions, “the very virtue of qualitative interviews is their openness” (1996, p. 56). The investigator gave the opportunity to the sampled teachers to freely and constructively express, without any constraints and limitations, their experiences, feelings and beliefs.

The qualitative inquiry addressed in depth questions of “why” as well as the “how”; in an attempt to better understand, and examine the results of the quantitative
analysis. Specifically, the qualitative component was employed in order to get more details on “why” they use computers at that particular level and type, “how” they use them (more in depth), and “what” makes them use them at that particular level and type.

To better address the study’s purposes, it was necessary that the data collection methods (the structured questionnaire and the interview protocols) to be directly related to the study’s research questions. The conceptual framework (See Appendix B) served as the basis to develop the structured questionnaires and the semi-structured, open-ended interviews. It had also served as the medium to connect the related literature with the study’s research questions, and finally, to develop the data collection instruments. The goal of the investigator was to achieve a direct relation and alignment of the conceptual framework, research questions, and the methods of data collection.

**Sample Participants and Procedures**

The population of the study consisted of 4th, 5th and 6th grade teachers in Cyprus elementary schools that have had computers in their classrooms since 2000 (since the Evagoras project began). For reasons of convenience, all teachers have been selected from the District of Nicosia. In the academic year of 2003-2004, 765 teachers in the district of Nicosia had computers in their classrooms.

The District of Nicosia is the island’s capital and the largest of its five school districts. The goal of the study is to be able to make generalizations concerning all elementary teachers that work in Cyprus public schools and apply computers in their
classrooms. Because of the above, the investigator suggests that the results from the quantitative and qualitative analysis can be generalized to some extent due to the centrality and the homogeneity of the system. This assumption is not based on any conceptual or empirical evidence, but on the investigator’s experience of a small country.

The instruments used for data collection include a structured questionnaire and two interview protocols (See Appendices D and E1, E2). The investigator used random sample to select the participants to whom the questionnaires were sent in order to be able to generalize the results for the entire population. The random sample was determined by the size of the population. Based on a formula developed by Stephen & William (1997), and since the total population falls in the range of 750-800, a total number of 255 teachers was needed, in order to have a representative sample of the population (765 teachers). Since the investigator decided to use the mail method, which has a low response rate (Zikmund, 1997), 500 teachers were randomly selected and sent questionnaires.

To select the teachers that participated in the interviews the researcher used purposeful sampling. As Merriam (1988) mentions, purposeful sampling is “used as a strategy when one wants to learn something and come to understand something about selected cases” (p.100). In this case the selected cases were the two categories of teachers that have been identified through the questionnaire as high and low computer users. Twelve teachers have been identified as low and ten as high computer users.
Data Collection Procedures - Instruments

Step 1: Permission from the Ministry of Education

First of all, in order to be able to distribute the questionnaires to elementary school teachers and to schedule interviews with them, the author had attained permission from the Ministry of Education in the summer of 2003. The author gave also a general overview of the proposed study to the Ministry of Education.

Step 2: Design and Development of the Instruments

The second step included the design and development of the two instruments used for the data collection. Using the related literature, the conceptual framework, and the study’s research questions, the investigator had developed the questionnaire and the interview protocols (see Appendices D and E1, E2). The data collection procedures took place in Cyprus Elementary schools in January/February 2004. The survey and the questionnaires were specifically designed for this study and reflect the current research regarding computer technology integration in schools.

Step 3: Translation and Pilot Study

At the end of December the instruments were translated in Greek. In order for the instruments to be translated, three groups of people worked together: the researcher, English literature teachers, the team responsible for the implementation of the Evagoras project, and finally two University professors. A professional organization, called PIO, verified the authenticity of the documents’ translation as required by the Office of Research Protections.

After the translation the researcher conducted a pilot study among 8 elementary teachers. The questionnaire and the interview protocols were given to the
teachers for revisions and feedback. The instruments were adjusted accordingly based on the suggestions of the teachers. Minor changes took place such as clarifications, better explanations of the questions, terminology, and expressions in order to adjust the instruments to the Cypriot teachers’ language, culture and perceptions.

**Step 4: Questionnaires**

The survey was administered in thirty four elementary schools in Cyprus. The questionnaires were sent out the first week of January. Two hundred ninety three elementary teachers agreed to participate in the study (out of 500 questionnaires that were sent out). The response rate was 58.6%.

The schools were randomly selected from the list given from the Ministry of Education. In each school, the researcher sent as many questionnaires as the number of teachers in 4th, 5th and 6th grade (the grades that have computers in their classrooms based on the Evagoras project). The questionnaires were mailed to the teachers at their school address. As requested by the Cyprus Ministry of Education, a letter was sent to the principal of the school, which explained the purposes of the study. Also, through the letter the researcher requested that the principals encourage teachers to complete the questionnaire and send it back. Envelopes and stamps were provided to the teachers in order to return the questionnaires.

**Procedures**

Teachers completed a questionnaire of 13 questions, pertaining to their personal demographics; computer use for personal, professional and organizational purposes; computer use in their classroom practices; factors that influence them in integrating computer technology in their classroom practices; and an open-ended
question. Individual responses were anonymous, confidential and not available to school principals, other respondents, or the Ministry of Education. Results of the study are available upon request to the respondents.

Specifically, there were 5 sections on the survey: 1) Teachers and School Demographics, 2) Teachers’ computer use for different purposes (personal, organizational, and instructional), 3) Students’ computer use in their classroom (as assigned by their teachers), 4) Factors that influence teachers in integrating computers in their classrooms, and 5) An open-ended question for more comments (See Appendix D).

**Step 5: Open-Ended, Semi-Structured Interviews**

The fifth step of data collection included the semi-structured, open-ended interviews. The investigator used the results from the questionnaires to select the teachers for the interviews. The author developed and used two kinds of interviews in order to better address the study’s research questions. Interview Protocol A (See Appendix E1) was designed for teachers that are high computer users. Interview protocol B (See Appendix E2) focuses on low computer users.

Through the interviews the investigator looked for themes that helped her in gaining better understanding and more information on whether or not teachers use computers in their classrooms, as well as how they use them – what activities, exercises they perform. Moreover, they helped her identify the factors related to the specific situation in Cyprus elementary schools (besides the ones revealed from the literature) that influence them in applying computers in their classrooms and differentiate their classroom practices in terms of computer technology integration.
Also, the interviews complemented and assisted in evaluating information on issues that cannot be easily and/or directly addressed through the questionnaire. Those include factors internal to teachers, mostly described by the professional group of factors, specifically through teachers’ philosophies/instructional practices, and to some extend by the personal group of factors.

As previously mentioned the criterion used in selecting the teachers that participated in the interviews was the frequency of classroom computer use and computer use for different purposes (personal, instructional, and organizational purposes). The process followed to classify the teachers as low and high computer users was based on the results of the questionnaires. Particularly, the investigator used teachers’ responses in Questions 9 and 10 to classify them. Teachers that have the highest number of responses, 5 out of the 7 responses in Question 9, and 10 out of 12 in Question 10, that they “Never” or “Seldom” use computers, have been categorized as Low computer users. On the other hand, teachers responded that they mostly use computers “Several times a month” or “Once a week” or “Several times a week”, had been categorized as High computer users (5 out of the 7 responses in Question 9, and 10 out of 12 in Question 10).

**Variables**

The independent and dependent variables used for the quantitative analysis are described in the following section.

**Independent Variables**

There are three major categories of independent variables. The first category named *Teachers and School Demographics* includes the following variables: school
region, teachers’ education, experience, age, gender, grade, and finally class size. The factors that influence teachers’ practices represent the second major category of independent variables. This category has four major elements 1) School climate, 2) Teachers’ professional behavior, 3) Teachers’ transformational behavior, and 4) Teachers’ attitudes towards integrating computers in the classroom.

The above four categories are elements that have been derived from the three categories of factors: personal, professional, and organizational; presented in the study’s conceptual framework (See Appendix B). Specifically, the author used the three groups of factors as guidelines to help her reveal through the data collection methods the factors that influence computer technology integration in the specific context - Cyprus elementary schools. The three groups of factors (presented in Appendix C) have not been fully and strictly addressed by the study due to their amount and detail. The above means that the study did not examine all the elements one by one that describe the three groups of factors. The investigator selected representative elements from each category that she believed would better contribute to examining and addressing the study’s research questions. Those factors will enlighten the researcher in her effort to evaluate the current situation and in understanding the level and kind of compute usage in Cyprus elementary classrooms. Finally, the elements that describe each group of factors have been differently approached by the study’s data collection methods.

The third major independent variable category is the Teacher-reported computer use in general. This variable describes the use of computers by the teachers for personal, instructional and organizational purposes.
Dependent Variable

The dependent variables were 1) Teacher-reported computer use in general, 2) Teacher-reported student classroom computer use, and 3) Teacher-reported student transformational classroom computer use. The author decided to examine specifically teachers’ transformational application of computers since, the study attempts to identify not only how teachers integrate computers in their classrooms but if they do that in ways that fundamentally transform and revolutionize education.

Data Analysis

Quantitative Data analysis

The author used the data collected from the questionnaire in order to calculate descriptive statistics as well as inferential statistics (regressions). As soon as the questionnaires were returned, they were coded, and entered into a statistical software package for analysis. The statistical package used for the data analysis was SPSS version 11.

Descriptive Statistics

Descriptive statistics were employed in order to give an overview of the “characteristics” of the major variables (independent and dependent) such as means, standard deviations, frequencies, and percentages. Descriptive statistics have been calculated for the parameters that describe the following groups of variables: 1) Teacher and school demographics, 2) Teacher-reported computer use in general, 3) Teacher-reported student classroom computer use, 4) Teacher-reported student transformational classroom computer use, 5) Factors that influence teachers in integrating computers in their classroom practices, and finally, 6) Teachers ranking of
factors in terms of their importance to them regarding computer technology integration in their classroom practices.

**Inferential Statistics - Regressions**

In addition, regression analysis has been conducted and has helped the author to examine associations and effects between the dependent and independent variables. The purpose of the regressions was to help the author predict and/or explain teacher computer use in general, as well as student classroom computer use.

**Qualitative Data Analysis**

As initial interviews were completed, they were transcribed, coded, and finally analyzed for emerging themes. A tape-recorder was used for the interviews. The researcher used a qualitative thematic analysis, which resulted in clustering data by key themes (Maxwell, 1996; Spradley, 1979). She fractured the data in terms of the major concepts (key themes) that were under examination through the interviews: teachers’ feelings regarding computer integration, computer usage in the classrooms, factors that facilitated or prevented computer use, suggestions for improvement, future of computer use in Cyprus elementary schools.

**Validity and Reliability**

Since validity is a goal rather than a product (Maxwell, 1996), the researcher has countered validity threats with care. In order to ensure consistency and address issues of reliability and validity across the different responses of the instruments used to collect data, the investigator employed various actions. Generally, validation of the data was achieved by triangulation of methods. The researcher compared teachers’ questionnaires with personal interviews.
First of all, the investigator addressed content validity. The purpose was to check if the items in each instrument measure/examine what they are supposed to. Expert readers conducted content validity. In this case the expert readers were the members of the investigator’s committee that were asked to review the data collection instruments. Afterwords, the instruments were translated into Greek. The team that is responsible for the implementation of the Evagoras project helped the investigator to translate the instruments. English literature teachers as well as University professors reviewed the instruments after they were translated in Greek. The purpose was to check the instruments’ content validity as well as wording, grammar, expressions, and technical terms after the translation into Greek. The next step was to pilot test the instruments by giving them to test respondents – elementary teachers. Eight teachers evaluated the instruments. They gave feedback that helped the investigator in revising, modifying, and improving the instruments.

In addition, to better address the issue of validity the investigator used different kinds of measures in the instruments, increased number of items (questions) as well as lengthened item scales. The author chose a specific period of time to send out the questionnaires, and schedule the interviews when the teachers did not considered themselves as being extremely busy; and as a result had time to give attention to the study. Two periods of the academic year are considered to be less busy than others; these being October-November, February-March. Those two periods had been chosen based on different criteria such as: schools’ opening and closing dates, national and religious holidays, ceremonies, and events that take place.
The author also tried to ensure consistent administration for the semi-structured, open-ended interviews in order to better address validity considerations.

The investigator tried to make sure that the conclusions of the study are valid. She tried to achieve the above through the implementation of multiple procedures, in different settings, and with varying participants. The researcher tried to do everything to make sure that both the data gained from the process, and the conclusions of the study were valid. Moreover, the investigator is aware that the methods used especially the personal interviews are vulnerable to self-report bias (Maxwell, 1996), thus she was conscious of threats to their reliability and worked towards insuring that the information collected was credible.

The researcher tried to minimize the bias in her interpretation in this area. The interviews were tape-recorded and the researchers made verbatim transcriptions of these recordings. She also made detailed, descriptive, concrete, specific, and chronological notes of the interviews, and transcribed the notes immediately. The goal was to understand their perspectives and to understand as best as possible and with as little bias as possible the meanings teachers attached to their words and actions (Maxwell, 1996). Finally, the researcher strived not to impose her values on the conduct or the conclusions of the study. She worked towards producing an informative report that strives for objectivity and integrity.

**Ethical Issues**

The researcher addressed participants’ confidentiality concerns and took all reasonable steps to allay those concerns. The researcher knows the names of the
schools, as well as the names of the principals and teachers; however no names were
given or will be given or mentioned in the research paper. She maintained
confidentiality in the context of questionnaires, interviews, analysis, and
dissemination to insure that all participants’ identities are protected. A tape-recorder
was used for the interviews. None of the participants expressed concern or felt
uncomfortable in using the tape-recorder. The final documents will be made available
to the research participants, if requested.
CHAPTER 4 – QUANTITATIVE DATA ANALYSIS

Introduction

Chapter 4 and 5 present the results of the data collected for this study. Questionnaires and interviews were the two major methods of data collection that were employed in Cyprus elementary schools during January-February 2004.

The aim of this analysis is to evaluate the current situation in terms of computer technology integration in Cyprus elementary schools. In particular through data analysis the study attempts to identify how elementary teachers in Cyprus apply computers in their classroom practices. Moreover, the study attempts to identify the factors that influence teachers in using computer technology in the classroom.

The quantitative analysis presented in this Chapter, includes descriptive and inferential statistics. Version 11 of the SPSS statistical package was used to analyze the quantitative data.

Descriptive Statistics

Teacher and School Demographics

In the first section of the questionnaire (Questions 1 to 8) the teachers were asked to answer eight questions related to teachers’ personal demographic characteristics such as age, gender, professional and school demographics such as class size, experience, as well as computer and internet use by the teachers.
Sixty-three percent of the teachers surveyed taught in urban schools, and thirty-seven percent taught in rural schools. The majority of the teachers surveyed (36 percent) taught in fifth grade (the sampled teachers taught in 4th, 5th and 6th grade). There were also some teachers, seven percent, that they did not have their own class, but taught different subjects at different grade levels (in 4th, 5th and 6th grade only). As far as the variable teachers’ years of experience is concerned, it was evenly distributed. Sixty-eight percent of the teachers surveyed fell into the range of 1.55 to 4.31 years (in a scale from 1 to 5) since the standard deviation was 1.38 (See Table 4.1). The average class size appeared to be 16-20 students (average number of 2.92 out of a possible 5). Particularly, forty-one percent of the teachers reported that they had 16-20 students in their classrooms while thirty percent of the teachers reported that they had between 21-25 students (see Table 4.1).

All of the teachers held a bachelors degree in Primary Education, four percent held a certificate. A certificate is a diploma beyond the bachelor, awarded to teachers who attend programs of study that last between three to nine months. Certificate is not a master’s degree. Twenty-two percent held a master’s degree and only two teachers (0.7 percent) held a doctorate (see Table 4.2). Eighty-six percent of the teachers did not report their bachelors’ majors. A list of the bachelors’ majors that the teachers reported can be seen in Appendix F – Table F.1. The same pattern emerged in the case of the other three categories that describe teachers’ education (certificate, master’s and doctorate): not all of the teachers reported their majors. A list of the teachers’ certificate, masters and doctorate majors can be found in Appendix F - Tables F.2, F.3 and F.4, respectively. Twenty-two percent of the teachers surveyed
reported having masters’ degrees. Twenty-one different master’s majors were reported. The most commonly found master’s degree held by teachers who reported their majors was in Educational Administration (6 teachers). Information Technology in Education, Linguistics, Computers in Education, and Curriculum and Instruction were reported by four teachers each (see Appendix F – Table F.3). Two teachers have reported holding a Ph.D., but only one gave his/her Ph.D major, which was Computers in Education (see Appendix F – Table F.4).

Table 4.1

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>%</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>185</td>
<td>63.1</td>
<td>.37</td>
<td>.48</td>
</tr>
<tr>
<td>Urban</td>
<td>108</td>
<td>36.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>293</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4&lt;sup&gt;th&lt;/sup&gt;</td>
<td>76</td>
<td>25.9</td>
<td>.38</td>
<td>1.10</td>
</tr>
<tr>
<td>5&lt;sup&gt;th&lt;/sup&gt;</td>
<td>105</td>
<td>35.8</td>
<td>.35</td>
<td>.48</td>
</tr>
<tr>
<td>6&lt;sup&gt;th&lt;/sup&gt;</td>
<td>88</td>
<td>30.0</td>
<td>.30</td>
<td>.45</td>
</tr>
<tr>
<td>Mixed</td>
<td>22</td>
<td>7.5</td>
<td>.07</td>
<td>.27</td>
</tr>
<tr>
<td>Total</td>
<td>291</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years of Experience</td>
<td></td>
<td></td>
<td>2.93</td>
<td>1.38</td>
</tr>
<tr>
<td>1-4</td>
<td>61</td>
<td>20.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-8</td>
<td>57</td>
<td>19.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-12</td>
<td>66</td>
<td>22.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13-16</td>
<td>59</td>
<td>20.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16+</td>
<td>49</td>
<td>17.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>292</td>
<td>99.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class Size</td>
<td></td>
<td></td>
<td>2.92</td>
<td>0.96</td>
</tr>
<tr>
<td>11-15</td>
<td>31</td>
<td>10.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-20</td>
<td>52</td>
<td>17.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-25</td>
<td>120</td>
<td>41.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26-30</td>
<td>86</td>
<td>29.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30+</td>
<td>3</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>292</td>
<td>99.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Regarding teachers’ age, forty-four percent of teachers surveyed, reported being between 22-30 years old, and forty-three percent reported that their age was between 31-40 years old (see Table 4.3). The largest percentage of teachers was females, (72 percent) (see Table 4.3), they used computer technology in their lives (94 percent) and particularly at home (93 percent) and at school (82 percent), and finally had internet connection in their home (85 percent) (see Table 4.4).

### Table 4.2

*Frequency Distribution of Teachers’ Education*

<table>
<thead>
<tr>
<th>Teachers’ Education</th>
<th>n</th>
<th>%</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor</td>
<td>293</td>
<td>100</td>
<td>1.00</td>
<td>0</td>
</tr>
<tr>
<td>Certificate</td>
<td>11</td>
<td>3.8</td>
<td>.04</td>
<td>.19</td>
</tr>
<tr>
<td>Master’s</td>
<td>64</td>
<td>21.8</td>
<td>.22</td>
<td>.42</td>
</tr>
<tr>
<td>Doctorate</td>
<td>2</td>
<td>0.7</td>
<td>.00</td>
<td>.08</td>
</tr>
</tbody>
</table>

### Table 4.3

*Frequency Distribution of Teachers’ Personal Demographics*

<table>
<thead>
<tr>
<th>Variable</th>
<th>N (Frequency)</th>
<th>%</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td>1.72</td>
<td>.44</td>
</tr>
<tr>
<td>22-30</td>
<td>128</td>
<td>43.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31-40</td>
<td>126</td>
<td>43.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41-50</td>
<td>18</td>
<td>6.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>51-60</td>
<td>20</td>
<td>6.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>61+</td>
<td>1</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>293</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td>1.77</td>
<td>.86</td>
</tr>
<tr>
<td>Male</td>
<td>81</td>
<td>27.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>212</td>
<td>72.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>293</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.4
*Frequency Distribution of Teachers’ Computer and Internet Use*

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Computer use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>276</td>
<td>94.2</td>
<td>1.05</td>
<td>.23</td>
</tr>
<tr>
<td>No</td>
<td>17</td>
<td>5.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>293</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Where teachers use computers</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home</td>
<td>272</td>
<td>92.8</td>
<td>.92</td>
<td>.25</td>
</tr>
<tr>
<td>School</td>
<td>239</td>
<td>81.6</td>
<td>.81</td>
<td>.38</td>
</tr>
<tr>
<td>Library</td>
<td>24</td>
<td>8.2</td>
<td>.08</td>
<td>.27</td>
</tr>
<tr>
<td>Internet Café</td>
<td>2</td>
<td>0.7</td>
<td>.00</td>
<td>.08</td>
</tr>
<tr>
<td>Total</td>
<td>293</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Internet connection</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>249</td>
<td>85.0</td>
<td>1.15</td>
<td>.35</td>
</tr>
<tr>
<td>No</td>
<td>44</td>
<td>15.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>293</td>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Computer Use by Teachers and Students*

Section 2 and 3 of the Questionnaire (Questions 9 and 10) related to computer use by teachers and students. Specifically, this section presents 1) teacher computer use in general (for personal, instructional, and organizational purposes), 2) student computer use in the classroom, and 3) student transformational computer use in the classroom, in particular.

*Teacher Computer Use in General*

Section 2 (Question 9) of the questionnaire, called Teacher Computer Use in General, described the kind and frequency of teachers’ use of computers for personal, instructional, and organizational purposes. Under this section, teachers had been asked to report on seven statements where they had to rate their own experiences regarding computer technology for the above three purposes. Respondents rated each of the seven statements using a 5-point Likert scale. The scale ranged from “Never” (value 1) to “Several times a week” (value 5).
The first three statements, “Personal use”, “Gathering materials for teaching”, and “Preparing materials for teaching”, appeared to be the ones that are mostly used by the teachers. Specifically, fifty-nine percent of the teachers reported applying computers for “Personal use”, “Several times a week”; thirty-two percent teachers surveyed reported that they “Gather material for teaching”, “Several times week”; and finally forty-two percent reported using computers to prepare material for teaching “Several times a week”. The largest percentage of teachers indicated that they “Never” or “Seldom” use computer technology to “Communicate with teachers or administrators by email” (75 percent) and “Keeping students records” (65 percent). The other two statements, “Presenting course material to students” and “Using computer technology as an educational tool in the teaching process”, were evenly distributed among the teachers.

The average numbers for the statements confirm the above (See Table 4.5). The first three statements appeared to have a relatively high score close to the end of the scale. In particular, their average numbers were 4.12, 3.59, and 3.84 (out of a possible 5), respectively. The following two statements: “Communicating with teachers or administrators by email” and “Keeping students records”, have the lowest average numbers (1.92 and 2.33). The above means that they are used less by the teachers in comparison with the rest computer uses. Finally, the following computer uses were evenly distributed among the teachers: “Presenting course material to students” and “Using computer technology as an educational tool in the teaching process” (See Table 4.5).
The researcher also used the statements in Question 9 in order to identify the overall level (frequency) of computer usage for different purposes by teachers. A new variable, Total Teacher-Reported Computer Use in General, was created by summing the scores of the seven statements comprising of Teachers’ Computer Use in General. The average value of the new variable was 20.91 (out of a possible 35) (see Table 4.7). The above shows that most of the teachers use computers in general “Once a week” or “Several Times a Week.”

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Use</td>
<td>4.12</td>
<td>1.26</td>
</tr>
<tr>
<td>Gathering material for teaching</td>
<td>3.59</td>
<td>1.28</td>
</tr>
<tr>
<td>Preparing material for teaching</td>
<td>3.84</td>
<td>1.26</td>
</tr>
<tr>
<td>Communicating with teachers or administrators by email</td>
<td>1.92</td>
<td>1.20</td>
</tr>
<tr>
<td>Presenting course material to students</td>
<td>2.52</td>
<td>1.20</td>
</tr>
<tr>
<td>Using computer technology as an educational tool at the teaching process</td>
<td>2.56</td>
<td>1.22</td>
</tr>
<tr>
<td>Keeping students records</td>
<td>2.33</td>
<td>1.34</td>
</tr>
</tbody>
</table>
Table 4.6
Frequency Distribution of Teacher-Reported Computer Use in General, Student Computer Use in the Classroom, and Student Transformational Computer Use in the Classroom (n=293)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I) Total of Teacher-Reported Computer Use in General (sum of statements in Question 9)</td>
<td>20.91</td>
<td>6.42</td>
</tr>
<tr>
<td>II) Total of Teacher-Reported Student Computer Use in the Classroom (sum of statements in Question 10)</td>
<td>24.44</td>
<td>9.58</td>
</tr>
<tr>
<td>III) Total of Teacher-Reported Student Transformational Computer Use in the Classroom (3 statements of Question 10)</td>
<td>5.89</td>
<td>2.70</td>
</tr>
</tbody>
</table>

Student Classroom Computer Use

Section 3 of the questionnaire (Question 10), Student Computer Use in the Classroom, gives an overview of the kind and frequency of student classroom computer use. In particular, it includes traditional/ common, as well as transformational computer uses by students in the classroom. Teachers had been asked to report on twelve statements. As in the previous section, teachers were asked to rate the frequency of student computer use in the classroom in each of the twelve statements using a 5-pont Likert scale. The scale ranged from “Never” (value 1) to “Several times a week” (value 5).

Most of the average numbers for the statements in Question 10 scored between 2.0 and 3.0 (out of a possible 5). Particularly, the average numbers ranked from 2.05 (Use educational software) to 2.32 (Write papers). The uses in the classroom that appeared to have low application (not frequently used) were the ones that had their average numbers below 2.0 (out of a possible 5). These uses were the following: as a reward for good behavior (mean=1.75), as a reward for good
performance (mean=1.74), and to solve complex problems (mean=1.58) (See Table 4.7).

Table 4.7
Frequency Distribution of Student Computer Use in the Classroom (n=293)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning subject matter</td>
<td>2.22</td>
<td>1.07</td>
</tr>
<tr>
<td>Playing games</td>
<td>2.08</td>
<td>1.23</td>
</tr>
<tr>
<td>Practicing work processing skills</td>
<td>2.16</td>
<td>1.12</td>
</tr>
<tr>
<td>Using educational software</td>
<td>2.05</td>
<td>1.09</td>
</tr>
<tr>
<td>As a reward for good behavior</td>
<td>1.75</td>
<td>1.04</td>
</tr>
<tr>
<td>As a reward for good performance</td>
<td>1.74</td>
<td>1.05</td>
</tr>
<tr>
<td>Writing papers</td>
<td>2.32</td>
<td>1.11</td>
</tr>
<tr>
<td>Preparing class projects</td>
<td>2.19</td>
<td>1.11</td>
</tr>
<tr>
<td>Searching the internet to gather educational material</td>
<td>2.16</td>
<td>1.16</td>
</tr>
<tr>
<td>Working collaboratively with other students</td>
<td>2.11</td>
<td>1.13</td>
</tr>
<tr>
<td>Solving complex problems</td>
<td>1.58</td>
<td>0.92</td>
</tr>
<tr>
<td>Working in the lab</td>
<td>2.01</td>
<td>1.05</td>
</tr>
</tbody>
</table>

The researcher also used the statements in Question 10 in order to identify the overall level (frequency) in terms of student instructional use of computers. She used the same approach as in Question 9. The researcher summed up teachers’ responses in all of the twelve statements and created a new variable, Total Student Computer Use in the Classroom. The average number of the new variable was 24.44 (out of a possible 60) (See Table 4.6). Based on the above, it seems that most of the teachers do not assign students work with computers for instructional purposes very often.
**Student Transformational Computer Use in the Classroom**

Statements in Question 10 were also used to identify how students use computers transformationally in their classroom practices. Specifically, three statements in Question 10, “Preparing class projects”, “Working collaboratively with others”, and “Solving complex problems”, have been used in order to describe transformational computer use. The researcher applied the same method as above in order to identify the level (frequency) of transformational computer usage. She created a new variable, Total Student Transformational Computer Use in the Classroom, by summing the scores of the three statements.

The average mean of the new variable created was 5.89 (out of 15 possible) (See Table 4.6). The above shows that the vast majority of the teachers surveyed, reported that they “Never” or “Seldom” apply computers transformationally in their classroom practices.

**Factors that Influence Teachers in Applying Computers in their Classroom Practices**

Section 4 of the questionnaire (Question 11 and 12) related to factors that influence teachers in applying computers in their classrooms. Through the statements the researcher attempted to identify these factors. Particularly, teachers were asked to rate how strongly they agreed or disagreed with eighteen statements. Teachers rated their responses using a 4-point Likert scale. The scale ranged from “Strongly Disagree” (value 1) to “Strongly Agree” (value 4).

Almost in all statements, the teachers surveyed reported that they “Agree” (value 3) with the statements. The average numbers for all the statements that teachers reported that they “Agree” ranged from 2.53 to 3.37, (out of a possible 4).
The statements where teachers reported that they “Strongly Agree” were the following: “It is important for the Cyprus educational system to teach students computer skills”; “Students should be active participants in the teaching process”; and “As a teacher, I find important to be continuously professionally trained on different issues.” This is shown by the average numbers of these three statements which were higher and closer to the end of the scale: 3.59, 3.43, and 3.58 (out of a possible 4) respectively (See Appendix G, Table G.1).

**Classifications of the Statements**

The statements in Question 11 had been classified in four categories: 1) Teachers’ Attitudes towards the use of computers in the classroom, 2) Teachers’ Professional Behavior, 3) School climate, and 4) Teachers’ Transformational Behavior. Table G.2 (Appendix G) presents how the statements were classified in the four categories. Some statements had not been classified into the four categories because their skewness values were out of the range of -1, +1. As suggested by Tabachnick and Fidell (2001) the skewness value of a variable should be between -1 and +1 in order to be used for statistical analysis. The rest of the variables had skewness values between the range of -1, +1.

The researcher added the responses of the teachers surveyed in order to get a total number for each of the four categories. She created four new continuous variables that represent each of the four categories. Table 4.8 presents the frequency distribution information for the four new variables created.

In Category 1 (Teachers’ Attitudes towards applying computers in the classroom) and 4 (Teachers’ Transformational Behavior), the responses of the
teachers were relatively evenly distributed between the “Agreement” and “Disagreement” categories. The “Agreement” category includes the “Agree” and “Strongly Agree” responses, and the “Disagreement” category includes the “Disagree” and “Strongly Disagree” responses. The average numbers of the two groups were 14.26 (out of a possible 24) and 4.45 (out of a possible 8), respectively (See Table 4.8).

In particular, regarding Category 1, teachers were divided in half to teachers that have positive attitudes and beliefs towards teaching with computers in the classroom (47 percent) and to teachers that have negative attitudes towards the application of computers in the classroom (53 percent) (See Table 4.9). Along the same lines, in Category 4, half of the teachers have positive attitudes towards transformational strategies and techniques and may have applied these strategies in their classrooms (46 percent). The other half of the teachers reported that they did not agree with the statements, and that means that they did not have positive attitudes and most probably had not applied any kind of transformational techniques in their classroom practices (54 percent) (See Table 4.9).

In Category 2, (Teachers’ Professional Behavior) ninety-six percent of the teachers reported that they “Agree” with the statements given to them (See Table 4.9). The average number of the category was around 12, for a variable, which had a possible maximum value of 16 (See Table 4.8). The results above show that most of the teachers had very good relationships with their colleagues in addition to being active in their profession.
Finally, in Category 3 (School Climate), sixty-five percent of the teachers reported that they disagreed with the statement related to this category (See Table 4.9). The average number of this category was around 2.28 (out of a possible 12) (See Table 4.8). The above means that the school climate was not supportive and helpful in terms of integrating computers and specifically, that most of the teachers in each school do not use computers frequently in their classroom practices.

Table 4.8

<table>
<thead>
<tr>
<th>Frequency Distribution of the Four Categories of Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
</tr>
<tr>
<td>Group 1 - Total Teachers Attitudes towards applying computers in the classroom *</td>
</tr>
<tr>
<td>Group 2 – Total Teachers’ Professional Behavior**</td>
</tr>
<tr>
<td>Group 3 – Total School Climate (organizational)***</td>
</tr>
<tr>
<td>Group 4 – Total Teachers’ Transformational Behavior****</td>
</tr>
</tbody>
</table>

* Continuous variable, scores in Category 1 could range from 6 to 24
** Continuous variable, scores in Category 2 could range from 4 to 16
*** Continuous variable, scores in Category 3 could range from 1 to 12
**** Continuous variable, scores in Category 4 could range from 2 to 8
Table 4.9  
*Frequency Distribution of Teacher-Reported Agreement and Disagreement in the Four Categories*

<table>
<thead>
<tr>
<th>Range</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Category 1 - Teachers Attitudes and Beliefs towards applying</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>computer applications in the classroom*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agreement (“Strongly Agree” and “Agree”)</td>
<td>139</td>
<td>47.4</td>
</tr>
<tr>
<td>Disagreement (“Strongly Disagree” and “Disagree”)</td>
<td>154</td>
<td>52.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>293</td>
<td>100</td>
</tr>
<tr>
<td><strong>Category 2 – Teachers’ Professional Behavior</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agreement (“Strongly Agree” and “Agree”)</td>
<td>281</td>
<td>95.9</td>
</tr>
<tr>
<td>Disagreement (“Strongly Disagree” and “Disagree”)</td>
<td>12</td>
<td>4.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>293</td>
<td>100</td>
</tr>
<tr>
<td><strong>Category 3 – School Climate (organizational)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agreement (“Strongly Agree” and “Agree”)</td>
<td>103</td>
<td>35.2</td>
</tr>
<tr>
<td>Disagreement (“Strongly Disagree” and “Disagree”)</td>
<td>190</td>
<td>64.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>293</td>
<td>100</td>
</tr>
<tr>
<td><strong>Category 4 – Teachers’ Transformational Behavior</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agreement (“Strongly Agree” and “Agree”)</td>
<td>135</td>
<td>46.1</td>
</tr>
<tr>
<td>Disagreement (“Strongly Disagree” and “Disagree”)</td>
<td>158</td>
<td>53.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>293</td>
<td>100</td>
</tr>
</tbody>
</table>

*Continuous variable, scores Category 1 could range from 13-24 (Agreement) and 6-12 (Disagreement)
** Continuous variable, scores Category 2 could range from 9-16 (Agreement) and 4-8 (Disagreement)
*** Continuous variable, scores Category 3 could range from 7-12 (Agreement) and 1-6 (Disagreement)
**** Continuous variable, scores Category 4 could range from 5-8 (Agreement) and 2-4 (Disagreement)
Ranking the Factors in Terms of Importance to Teachers Regarding Computer Technology Integration in Their Classrooms

In Question 12 (the second part of Section 4), the teachers surveyed were asked to rank six statements out of ten in terms of their importance regarding computer technology integration in their classroom practices.

Table 4.10 presents the average ranking of each of the ten statements. The statements with the lowest average numbers are the ones that were ranked as the most significant for the teachers (since teachers gave the value of 1 to the most significant statement, and the value of 6 to the least significant statements). Teachers’ college preparation in acquiring computer skills appeared to be the most significant factor, since its average number is the lowest, 2.72. Teachers’ personal attitudes towards computer technology and Teachers’ level of computer literacy proved to be the second and third most important statements for teachers, respectively. Moreover, Statements 7 and 10 have the highest average numbers, 4.83, and 4.86 respectively. The above means that they were ranked as the least significant statements for the teachers (See Table 4.10).

Question 13 was an open-ended question on the survey and gave the opportunity to teachers to comment on anything else they wanted to or to highlight any other issues related to computer technology integration in schools. The comments made by teachers in Question 13 are aligned with what teachers mentioned in the interviews (described and analyzed in Chapter 5).
Table 4.10
Frequency Distribution of Statements Ranked by Teachers in terms of their Importance Regarding Computer Technology Integration in Classroom

<table>
<thead>
<tr>
<th>A/A</th>
<th>Factors</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Statement 2 - My college preparation in acquiring computer skills</td>
<td>2.72</td>
<td>1.67</td>
</tr>
<tr>
<td>2</td>
<td>Statement 1 - My personal attitudes towards computer technology</td>
<td>2.98</td>
<td>1.93</td>
</tr>
<tr>
<td>3</td>
<td>Statement 6 - My level of computer literacy</td>
<td>3.05</td>
<td>1.76</td>
</tr>
<tr>
<td>4</td>
<td>Statement 3 - My college preparation in integrating computers into the classroom or curriculum</td>
<td>3.18</td>
<td>1.55</td>
</tr>
<tr>
<td>5</td>
<td>Statement 4 - My professional development activities in acquiring basic computer skills</td>
<td>3.20</td>
<td>1.40</td>
</tr>
<tr>
<td>6</td>
<td>Statement 5 - My professional development activities in integrating computers into the curriculum</td>
<td>3.47</td>
<td>1.14</td>
</tr>
<tr>
<td>7</td>
<td>Statement 9 - Having access to technology resources (software, hardware etc)</td>
<td>3.64</td>
<td>1.67</td>
</tr>
<tr>
<td>8</td>
<td>Statement 8 - The way in which I am assessed or evaluated for using computers in my classroom</td>
<td>4.38</td>
<td>1.81</td>
</tr>
<tr>
<td>9</td>
<td>Statement 7 - The level of support my principal provides to me in terms of integrating computers into the curriculum</td>
<td>4.83</td>
<td>1.14</td>
</tr>
<tr>
<td>10</td>
<td>Statement 10 - The level of support and assistance that I receive from my district/local technology coordinator</td>
<td>4.86</td>
<td>1.25</td>
</tr>
</tbody>
</table>

Regressions

This section presents the regression analysis conducted for the purposes of this study. Regression analysis has been conducted in order to examine the relationships and effects between the dependent and independent variables. The purpose of the
regressions was to help the investigator to predict and/or explain teachers’ computer use for different purposes, student classroom computer use, and student transformational classroom computer use. The above were treated as the dependent variables in the regression analysis. In order to predict teacher and student computer use, the investigator used teacher and school demographics and the four categories of factors, as the independent variables. The regressions presented in the following section are those that had significant results and were directly or indirectly related to the major questions that are under investigation in this study.

Variables Used in the Regression Analysis

Table 4.11 presents the variables entered in the regression analysis. It gives the coding used in the regressions, a name given for each variable, as well as the mean and standard deviation for each variable. For example, the variable REGION was coded “1” for urban schools and “0” for rural schools. The same applies for GENDER which was coded “1” for female and “0” for male teachers. The variable GRADE is represented by three dummy variables: FIFTH, SIXTH and MIXED GRADE. The last variable represents teachers that did not have their own class but taught different subjects in the 4th, 5th, and 6th grades. Fourth grade teachers represented the comparison group so it has not been entered in the regression analysis and it is not presented in Table 4.11.

Teachers’ experience (TCHEXP), teachers’ age (TCHAGE), and class size (CLSSIZE), were represented by 5-level categorical variables centered around their modal categories. For example, for the variable TCHEXP the modal category was “3”, so it was centered around “3”. The modal category “3” represents teachers whose
experience falls in the range of 9-12 years (See Table 4.1 for more details in terms of the rest of the teachers’ experience levels). For the variable TCHAGE the modal category was “1” and the variable was centered around “1”. The modal category “1” represents teachers whose age ranged from 22 to 30 years old (See Table 4.3 for more details on teacher’s age levels). Finally, the modal category for CLSSIZE was “3”, and represents classes that have 21 to 25 students (See Table 4.1 for more details on class size levels).

Teachers’ education (TCHEDU) is coded as dummy variable with two levels. The first level, Masters and above, which was coded as “1” includes teachers that hold masters and Ph.Ds. Teachers that hold bachelor and certificates (all of the teachers hold bachelor degrees) comprised the second level, Below Masters, which was coded as “0”.

Besides variables that describe school and teachers’ demographic characteristics, three variables that describe teacher and student use of computer technology are also used in the regression analysis. The first variable, teachers’ use of computer technology in general, (TCHCM) had been created by adding teachers’ responses to seven statements regarding their use of computers for different kinds of purposes such as personal, organizational, and instructional. This continuous variable has been centered around its mean. Table 4.5 presents the statements that have been used in order to create the TCHCM variable.

The same process was applied in the case of the other two variables that describe student computer use. The second variable, student computer use in the classroom (STDCLSCM), had been created by adding teachers’ responses to twelve
statements regarding the way that students use computers in the classroom. In Table 4.7 the twelve statements that comprise STDCLSCM are presented. This continuous variable has been centered around its mean. Finally, the third variable, student transformational classroom computer use (STDTFCM) was created by adding three of the twelve statements that were used to describe student classroom computer usage (STDCLSCM). The statements are the following: “Preparing class projects”, “Working collaboratively with others”, and “Solving complex problems” (See Table 4.7). This continuous variable has been centered around its mean, as well.

The last four variables represent factors that influence teachers’ use of computers in their classroom practices. These factors are grouped into four categories. The first variable represents teachers’ attitudes towards computer use in the classroom (COMPATT) and was created by summing teachers’ responses to six statements. The second variable that represents teachers’ professional behavior (PROFESSB) was created by adding teachers’ responses to four statements. School climate (CLIMATE) in terms of computer use at school by the teachers was the third factor and is represented by only one statement. Finally, the fourth factor called teachers transformational behavior (TRANSB) had been created by adding teachers’ responses to two statements. See Table 4.10 (described and explained previously) for more details regarding the statements that comprise each of the four factors. All the above groups of factors were treated as continuous variables and were centered around their means before being entered into the regression analysis.

<table>
<thead>
<tr>
<th>Table 4.11</th>
<th>Variable Descriptions and Distributions Used in the Regression Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Mean</td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
</tr>
<tr>
<td>Variable Name</td>
<td>Mean</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>REGION (equals 1 if urban school)</td>
<td>.37</td>
</tr>
<tr>
<td>FIFTHGRD (equals 1 for 5th grade teachers)</td>
<td>.36</td>
</tr>
<tr>
<td>SIXTHGRD (equals 1 for 6th grd. Tchrs.)</td>
<td>.30</td>
</tr>
<tr>
<td>MIXGRD (equals 1 for mixed grd. tchrs.)</td>
<td>.07</td>
</tr>
<tr>
<td>GENDER (equals 1 for female tchrs.)</td>
<td>.72</td>
</tr>
<tr>
<td>TCHEXP (5 level categorical, centered around modal category)</td>
<td>-.06</td>
</tr>
<tr>
<td>TCHAGE (5 level categorical, centered around modal category)</td>
<td>.77</td>
</tr>
<tr>
<td>CLSSIZE (5 level categorical, centered around modal category)</td>
<td>-.08</td>
</tr>
<tr>
<td>TCHEDU (equals 1 if MA and above)</td>
<td>.22</td>
</tr>
<tr>
<td>TCHCM (centered around the mean)</td>
<td>.00</td>
</tr>
<tr>
<td>STDCLSCM (centered around the mean)</td>
<td>.00</td>
</tr>
<tr>
<td>STDTFCM (centered around the mean)</td>
<td>.00</td>
</tr>
<tr>
<td>COMPATT (centered around the mean)</td>
<td>.00</td>
</tr>
<tr>
<td>PROFESSB (centered around the mean)</td>
<td>.00</td>
</tr>
<tr>
<td>CLIMATE (centered around the mean)</td>
<td>.00</td>
</tr>
<tr>
<td>TRANSB (centered around the mean)</td>
<td>.00</td>
</tr>
</tbody>
</table>

1 General computer usage by teachers, created by adding seven statements (See Table 4.5)
2 Teachers use of computer technology in their classroom practices, created by adding twelve statements (See Table 4.7)
3 Teachers’ transformational use of computer technology in their classroom practices, created by adding three statements (See Table 4.7)
4 Teachers’ attitudes towards classroom computer usage created by adding six statements (See Table 4.10)
5 Teachers’ professional behavior, created by adding four statements (See Table 4.10)
6 School Climate, represented by only one statement (See Table 4.10)
7 Teachers’ transformational behavior was created by adding two statements (See Table 4.10)

**Relationship between Teacher General Computer Use and Student Computer Use in the Classroom**

The investigator examined the relationship between teacher general computer use and student classroom computer use. Student computer use was measured in two ways: 1) student classroom computer use and 2) student transformational classroom
computer use. The researcher used correlation analysis to examine the association among these three types of usage (TCHCM, STDCLSCM, and STDTFCM).

The results of the correlation analysis revealed that there is a positive but not that strong correlation between TCHCM and STDCLSCM ($\rho = 0.339$) as well as between TCHCM and STDTFCM ($\rho = 0.241$). The positive relation suggests that the higher the teacher general computer use is, the higher the student classroom and transformational computer use are. In other words, teachers that use computers in general more, tend to assign their students to use computers in their classroom more, either transformationally or not. Both correlations were significant at .01 level.

**Teacher and School Demographics Effects on Teacher and Student Computer Use**

The first step of the regression analysis was to examine how teacher demographic characteristics and school factors influence teacher and student computer use. Teachers’ demographic characteristics and school factors (region, grade, years of experience, class size, education, gender, and age) were used as independent variables in order to predict 1) teacher use of computer technology in general, 2) student classroom computer use, and 3) student transformational classroom computer use. Table 4.12 summarizes the results of the three regression analyses presenting the non-standardized (B) and standardized (Beta) coefficient estimates of the independent variables.

Most of the teacher demographic characteristics and school factors are not significant contributors in predicting teacher general computer use, student classroom computer use, and student transformational classroom computer use. Specifically, it
appears to be little difference in usage patterns (TCHCM, STDCLSCM, STDTFCM) across region, teachers’ experience, fifth grade, sixth grade, class size, and gender. We do, however, find a tendency for mixed grade teachers to use computers transformationally more. On the other hand, Teachers’ education (TCHEDU) is significantly linked to all three kinds of use.

Regarding teacher computer use for different purposes, two variables appeared to be significant predictors, teachers’ education age. Both variables were significant at .01 level. Teachers with master’s and Ph.D degrees were more likely to use computers. Additionally, along the same lines the negative value of the teachers’ age coefficient estimate shows that younger teachers were more likely to use computers in general. Teacher and school demographics are positively but not highly correlated with teacher computer use in general. They explain only 16.5% of the variation of teacher computer use in general (See Table 4.12).

Student classroom computer use is also examined in Table 4.12. As previously mentioned, student use of computer technology is examined through two parameters: 1) student classroom computer use and 2) student transformational classroom computer use. The study uses the above distinction in order to investigate how the idea of transformational classroom computer use differs from the overall classroom computer use.

In the regression where teacher and school demographics were used to predict student classroom computer use, generally teachers’ education was the only significant predictor at .01 level. Specifically, the coefficient estimate of teachers’ education indicates that teachers that have masters and PhDs were more likely to use
computers in their classrooms than teachers that hold only bachelor degrees and certificates. The standardized coefficient of teachers’ education estimate has a value of .17, a value much lower than the regression coefficient estimate of teachers’ education in the previous regression. Teachers do not seem to apply computer technology in the classroom (through assigning students to use computers in the classroom) as much as they do for general purposes.

Once more, teacher and school demographics have a positive but relatively low correlation with student classroom computer usage. They explain only 6% of student computer usage in the classroom (See Table 4.12).

The final regression presented in Table 4.12 examined the effects of teacher demographic characteristics and school factors on student transformational classroom computer use. From the regression results, two independent variables, teachers’ education and mixed grade, appeared to be significant at .05 and .1 levels, respectively. The regression results suggest once more that teachers that have masters and Ph.D’s were more likely to apply computers transformationally (assign their students to use computers transformationally) than teachers that have only bachelors and certificates. Comparing the standardized regressions coefficient estimates of the three uses, transformational use has the lowest. Teachers seem to apply computers transformationally less compared to classroom computer use, and even less compared to general computer use.

The other variable that appeared to be significant is mixed grade. This variable represents teachers who do not have their own class but teach different subjects such as geography, science, arts and crafts etc, in 4th, 5th and 6th grade. The standardized
coefficient estimate suggests that teachers that do not have their own class but teach
different lessons, were more likely to assign their students to use computer
technology transformationally than teachers that teach in fourth grade.

As in the previous regression, correlation between teacher and school
demographics is positive, and relatively very low. They explain only 7% of the
variation in student transformational computer use in the classroom.

Table 4.12
School and Teacher Demographics Effects on Teacher and Student Computer Use

<table>
<thead>
<tr>
<th>Variable</th>
<th>Teacher general computer use</th>
<th>Student computer use in the classroom</th>
<th>Student transformational computer use in the classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>REGION</td>
<td>.11</td>
<td>.01</td>
<td>-.41</td>
</tr>
<tr>
<td>TCHEDU</td>
<td>3.94***</td>
<td>.26***</td>
<td>3.83***</td>
</tr>
<tr>
<td>TCHEXP</td>
<td>.05</td>
<td>.01</td>
<td>.16</td>
</tr>
<tr>
<td>FIFTHGRD</td>
<td>-.50</td>
<td>-.04</td>
<td>-1.49</td>
</tr>
<tr>
<td>SIXTHGRD</td>
<td>-.08</td>
<td>.01</td>
<td>-4.67</td>
</tr>
<tr>
<td>MIXGRD</td>
<td>.55</td>
<td>.02</td>
<td>18.55</td>
</tr>
<tr>
<td>CLSSIZE</td>
<td>.40</td>
<td>.06</td>
<td>-0.64</td>
</tr>
<tr>
<td>TCHAGE</td>
<td>-2.12***</td>
<td>-.28***</td>
<td>-0.38</td>
</tr>
<tr>
<td>GENDER</td>
<td>-1.39</td>
<td>-.09</td>
<td>-0.75</td>
</tr>
</tbody>
</table>

r² .165 .06 .07

Effects of School Climate, Teachers’ Professional Behavior, Teachers’ Transformational Behavior, and Teachers’ Attitudes towards Computer Technology in the Classroom, on Student Computer Use in the Classroom

Since the focus of this study is to examine student use of computers in the
classroom, as well as investigate how transformational classroom computer uses
differ from the overall classroom computer uses, the following sets of regressions
examine the effects of four groups of factors. These factors are school climate
(CLIMATE), teachers’ professional behavior (PROFESSB), teachers’
transformational behavior (TRANSB), and teachers’ attitudes toward computer use in the classroom (COMPATT) regarding 1) student computer use in the classroom, and 2) student transformational computer use in the classroom. Due to the focus of the study, teacher computer usage in general, had been eliminated from this set of regressions. Also, another reason is that teacher general computer use is positively and relatively high related to student classroom and transformational computer use.

This set of regressions, examined the effects of the four factors (CLIMATE, PROFESSB, TRANSB, AND COMPATT) on student computer use in the classroom along with the effects of teacher and school demographics, which now serve as the control variables. The first regression, presented in Column I, in both cases: 1) student classroom computer use and 2) student transformational classroom computer use, Tables 4.13 and 4.14, respectively, includes all variables, besides teachers’ attitudes towards the use of computer technology in the classroom. This variable was reserved for the regressions presented in Column II in Tables 4.13 and 4.14; because there is some question as to whether attitude leads to behavior change, or behavior change leads to attitude change.

In the regressions presented in Tables 4.13 and 4.14 the vast majority of teacher and school demographics appeared surprisingly not to be significant predictors in student classroom computer use. Those variables are region, teachers’ experience, fifth grade, mixed grade, class size, teachers’ age, and gender. One would expect, based on literature results summarized in Chapter 2, that variables such as teachers’ experience, teachers’ age as well as class size would have been significant predictors for applying computers in the classroom.
Table 4.13 summarizes the results of the regressions where student classroom computer use is the dependent variable. In the first regression, where the variable teachers’ attitudes toward computer use in the classroom, was eliminated, four variables were significant predictors of student classroom computer use. Out of the three factors entered in the regression analysis, two proved to be as significant: school climate, and teachers’ professional behavior. From the control variables, teachers’ education, and sixth grade, appeared to be significant predictors.

School climate, a continuous variable, represented by one statement: “Most of the teachers in my school seldom use computers in their classrooms,” See Appendix G, Table G.2) is significant, at .05 level, in predicting student classroom computer use. The negative value of the standardized coefficient estimate suggests that in schools where the school climate towards computer was positive and supportive, teachers were more likely to apply computers in their classrooms, than schools where the climate was negative and not supportive (where teachers did not use computers in their classrooms frequently).

Teachers’ professional development appeared to be significant at the .01 level in predicting student classroom computer use. This continuous variable has been created by adding four statements (See Appendix G, Table G.2 for the list of statements). The standardized coefficient estimate of this variable shows that teachers that are active in their profession, that take over responsibilities in their schools, collaborate with their colleagues and in general have a higher level of professional behavior, tend to assign their students to use computer technology in their classrooms more than teachers that do not have the above described professional behavior.
Teachers’ education continues to be a significant predictor in this regression, as well, at .05 level. Teachers that hold masters and PhDs tend to use computers in their classrooms more than teachers that hold only bachelors and certificates. The other control variable that appeared to be significant is sixth grade. This variable represents the teachers that teach sixth grade and had been categorized as “1”. The comparison variable is fourth grade, which has not been entered in the regression analysis. The results of the regression suggest that teachers that teach sixth grade were more likely to use computers than teachers that teach fourth grade.

Finally, as discussed above R- square is positive, not as strong, but higher than the two previous regressions (See Table 4.12) that included only school factors and teacher demographic characteristics. This regression explains 16% of the variation in student classroom computer use.

The second regression presented in Table 4.13 adds teachers’ attitudes towards the use of computers in the classroom. This is a continuous variable that has been created by adding six statements (See Appendix G, Table G.2 for the list of statements). School climate, teachers’ professional behavior, along with the new variable entered, revealed to be significant in this regression. Specifically, the standardized coefficient estimate of the new variable entered suggests that teachers that tend to have positive attitudes towards applying computers in the classroom were more likely to assign their students to apply computers in their classrooms than teachers that do not have positive attitudes towards computer integration in the classroom.
Teachers’ attitudes appeared to be an important variable. Besides the fact that it is a significant predictor at .01 level, R-square increased from 16% to 20% after adding this variable in the second regression (See Table 4.13, Column II).

Table 4.13
Effects of School Climate, Teachers’ Professional Behavior, Teachers’ Transformational Behavior and Teacher’s Attitudes towards Classroom Computer Use on Student Computer Use in the Classroom

<table>
<thead>
<tr>
<th>Variable</th>
<th>I</th>
<th>Beta</th>
<th>II</th>
<th>Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controls</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REGION</td>
<td>.09</td>
<td>.00</td>
<td>-.58</td>
<td>-.02</td>
</tr>
<tr>
<td>TCHEDU</td>
<td>2.93**</td>
<td>.13**</td>
<td>2.13</td>
<td>.09</td>
</tr>
<tr>
<td>TCHEXP</td>
<td>.00</td>
<td>.00</td>
<td>.24</td>
<td>.03</td>
</tr>
<tr>
<td>FIFTHGRD</td>
<td>1.54</td>
<td>.07</td>
<td>1.43</td>
<td>.07</td>
</tr>
<tr>
<td>SIXTHGRD</td>
<td>2.62*</td>
<td>.12*</td>
<td>2.39*</td>
<td>.11*</td>
</tr>
<tr>
<td>MIXGRD</td>
<td>2.88</td>
<td>.08</td>
<td>3.36</td>
<td>.09</td>
</tr>
<tr>
<td>CLSSIZE</td>
<td>-.27</td>
<td>-.02</td>
<td>-.47</td>
<td>-.04</td>
</tr>
<tr>
<td>TCHAGE</td>
<td>-.87</td>
<td>-.07</td>
<td>-.01</td>
<td>-.00</td>
</tr>
<tr>
<td>GENDER</td>
<td>-.07</td>
<td>-.00</td>
<td>.02</td>
<td>.00</td>
</tr>
<tr>
<td>School Climate and Teacher Professional Behavior</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLIMATE</td>
<td>-1.77**</td>
<td>-.13**</td>
<td>-1.73**</td>
<td>-.12**</td>
</tr>
<tr>
<td>PROFESSIONB</td>
<td>1.49***</td>
<td>.29***</td>
<td>.98***</td>
<td>.19***</td>
</tr>
<tr>
<td>TRANSB</td>
<td>.75</td>
<td>.06</td>
<td>.55</td>
<td>.04</td>
</tr>
<tr>
<td>Teacher Attitudes toward Computer Use In the Classroom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMPATT</td>
<td></td>
<td></td>
<td>1.35***</td>
<td>.25***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>r²</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.16</td>
<td>.20</td>
</tr>
</tbody>
</table>

* p<.10; ** p<.05; *** p<.01

Table 4.14 summarizes the results of the regressions where student transformational computer use in classroom is the dependent variable. As above, two regressions comprise this set, the first without teachers’ attitudes toward computers in the classroom variable, and the second with that variable.
In the first regression, school climate and teachers’ professional behavior appeared once more to be significant variables. School climate appeared to have higher influence on transformational computer use than classroom computer use, since its standardized coefficient value is higher in the regressions (-.15), presented in Table 4.14, Column I than the coefficient of the same variable (-.13) given in the regression presented in Table 4.13, Column II. On the other hand, professional behavior, has a lower influence on transformational classroom computer use since its standardized coefficient estimate, .27, (Table 4.14. Column I) is lower than the coefficient estimates of the same variable, .29, in the regression in Table 4.13, Column I.

From the control variable group, once more teachers’ education proved to be a significant predictor. None of the rest of the school and teacher demographics has significant contribution in predicting student transformational classroom computer use. Finally, R² remains at the same level, 16%, as in the regression in Table 4.13, Column I.

The second set of regressions, which includes teachers’ attitudes towards computer use in the classroom, shows again the three groups of factors (CLIMATE, PROFESSB, and COMPATT) to be significant predictors. All three factors are significant at .01 level. Even though there are significant predictors, the three groups of factors have a different impact on predicting student transformational classroom computer use than the same factors had in predicting student classroom computer use. CLIMATE has a higher impact in predicting transformational computer use, and PROFESSB has a lower impact in predicting transformational computer use.
Interestingly enough, COMPATT has the same standardized coefficient estimate. As a result, it has the same impact on both classroom computer uses (See Table 4.13, Column I and Table 4.14, Column II). Surprisingly, teachers’ transformational behavior did not appear to be a significant factor in any of the regressions.

From the control variables, two seemed to be significant in predicting student transformational classroom computer use: region and mixed grade. This is the first time that region appeared to be significant in a regression analysis. Unexpectedly, the standardized regression coefficient estimate for region is negative, -.11 (See Table 4.18, Column II). Since, urban has been coded as “1”, the above means that teachers in urban schools tend to assign their students to use computers transformationally less than teachers that are in rural schools. Along the same lines, mixed grade appeared to be a significant predictor for the first time in these two sets of regressions. Teachers that do not have their own class and they teach 4th, 5th, and 6th grade different lessons were more likely to ask their students to use computers transformationally, than teachers that teach 4th grade (the comparison group). Moreover, teachers’ education for the first time was not a significant variable in a regression.

As above, COMPATT appeared to be an important variable besides the fact that is a significant predictor at .01 level, the R-square increased from 16% to 20% after the addition of this variable in the second regression (See Table 4.14). That was the same increase as in the previous set of regressions (See Table 4.13).

Table 4.14
Effects of School Climate, Teachers’ Professional Behavior, Teachers’ Transformational Behavior and Teachers’ Attitudes towards Classroom Computer Use on Student Transformational Computer Use in the Classroom

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Overview of the Findings

Summarizing the descriptive statistics analysis the following results were revealed. The majority of the teachers surveyed taught in urban schools (63 percent), taught in fifth grade (36 percent), were females, (72 percent), used computer technology in their lives (94 percent) and particularly at home (93 percent) and at school (82 percent), and finally they had internet connection in their home (85 percent). The average class size appeared to be 16-20 students. Regarding teachers’ years of experience, the teachers surveyed were evenly divided into the categories given. Finally, in terms of teachers’ education all of the teachers held a bachelor
degree in Primary Education, four percent held a certificate, twenty-two percent held master’s degrees and only 0.7 percent (2 teachers) held Ph.Ds.

The results of the quantitative analysis indicated that while Cypriot teachers use computers rather extensively for their own purposes, they use them less frequently in their classes. When they do use them in their classes, it tends to be in a rather sporadic fashion, more as “extras” or fancy chalkboards than as true learning tools. Few teachers were found to use computers in any sort of constructivist or progressive way.

The results also reveal that sixty-five percent of the teachers seldom use computers in their classrooms, due to the school climate; fifty-four percent of the teachers did not tend to apply transformational behavior in their classroom practices; and fifty-three percent of the teachers did not have positive attitudes towards computer technology integration in their classroom practices. On the other hand, ninety-six percent of the teachers appear to have a good relationship with their colleagues, they were active in their profession, and they took over responsibilities in their schools.

Finally, teachers ranked the factors that were significant to them in terms of integrating computers in their classroom practices. Teachers reported as the first three important factors the following: 1) their personal attitudes towards computer technology, 2) their college preparation in acquiring computer skills, and 3) their level of computer literacy. The two factors that appeared to have the least impact on teachers in applying computers in their classroom practices are: 1) the amount of support the principal provides to teachers in terms of integrating computers into the
curriculum and 2) the amount of support and assistance they receive from the district/local technology coordinator.

Additionally, the results of the correlation analysis revealed that there is a positive but not that strong correlation between teacher general computer use and student classroom computer use ($\rho = .339$); as well as between teacher general computer use and student transformational classroom computer use ($\rho = .241$).

The first set of the regressions examined how teacher demographic characteristics and school factors influence teacher general computer use, student classroom computer use, and student transformational classroom computer use. The results are summarized as follows. Teachers’ education is significantly linked to all three kinds of uses. Teachers’ age appeared to be a significant predictor, at .01 level, for teachers’ computer use for different purposes. Finally, mixed grade appeared to be significant at .1 level in predicting student transformational classroom computer use.

The second set of regressions (comprised by four regressions – groups of two regressions) examined the effects of the four categories of factors (School Climate, Teachers’ Professional Behavior, Teachers’ Transformational Behavior, and Teachers’ Attitudes Towards the use of computers in education) on student classroom computer use and transformational classroom computer use, along with the effect of teacher and school demographics, which served as the control variables.

In the first two regressions, student classroom computer use was the dependent variable. The first regression included all variables besides Teachers’ Attitudes towards the use of computer in education (the same applies for the second group of regressions discussed in the next paragraph). In both regressions, sixth grade
at .1 level; school climate at .05 level; and teachers’ professional behavior at .01 level; appeared to be significant predictors for student classroom computer use. Teachers’ education is a significant predictor at .05 level at the first regression, and teachers’ attitudes towards computer use in education is a significant predictor at the second regression at .01 level.

Finally, in the last two regressions student transformational classroom computer use was the dependent variable. In both regressions, school climate and teachers’ professional behavior appeared to be significant at .01 level. From the control variables, teachers’ education appeared to be significant at the first regression; region and mixed grade are significant predictors at the second regression. All variables are significant at .1 level. Teachers’ attitudes towards computer use, is significant once more at the second regression, at .01 level.

Quantitative analysis provided significant information in order to move on to the interviews with the teachers. The qualitative analysis, presented Chapter 5, includes a transcription analysis and summary of the themes that emerged from the interviews.
CHAPTER 5 – QUALITATIVE DATA ANALYSIS (INTERVIEWS)

Introduction

As previously mentioned, qualitative analysis is the second major method that the researcher used in order to address the research questions of the study. Qualitative analysis attempts to examine in depth teacher use of computers in the classroom and the factors that influence teachers in applying them in their classrooms. From the two hundred-ninety-three teachers that completed questionnaires, only twenty-two teachers agreed to be interviewed. Based on the results of the questionnaires, teachers had been classified as low and high computer users. Specifically, teachers’ answers in Questions 9, and 10 guided the researcher to divide them into the two categories. Teachers that responded that they “Never” and/or “Seldom” use computer technology have been categorized as Low Computer Users (5 out of the 7 responses for Question 9, and 10 out of 12 questions for Question 10). On the other hand teachers that responded that they use computers “Several times a month” and/or “Once a week” and/or “Several times a week” had been categorized as High Computer Users (5 out of the 7 responses for Question 9, and 10 out of 12 for Question 10).

Since the goal of the researcher was to interview 10-15 teachers from each group, she decided to interview all the teachers that had accepted to be interviewed and then she classified them accordingly in the two categories. From the twenty-two teachers, twelve were classified as low and ten as high computer users. The researcher used the questions of the interview protocols as guidelines in order to address the
issues she would like to, but at the same time she gave flexibility to the teachers to freely express themselves.

After the completion of the interviews it appeared that teachers can be classified into three categories, instead of two: 1) high users, 2) low users that do not use computers frequently due to organizational factors, otherwise moderate computer users, and 3) low users that do not use computers frequently due to personal, professional and organizational factors. Organizational factors that prohibit the use of computers in the classrooms include lack of materials, resources, support, lack of time, pressure to cover the curriculum etc. Personal and professional factors include teachers’ personal beliefs and attitudes towards computer technology as well as their overall instructional philosophies. Based on the above, eight out of twelve teachers that were initially classified as low computer users were classified as moderate and four were classified as low computer users.

Moderate users have similar characteristics with high users. They are computer literate, they are educated in the field of educational technology, they have realized the importance of using computers in our lives and the need to integrate computers in education. Low users appeared not to have realized or understood the significance of technology in our lives as well as how computer technology could be used as a tool in the classroom to promote teaching and learning besides playing games, searching the Internet and writing essays.

This section presents a summary of the interview results. The author organized teachers’ responses in thematic units related to the concepts that are under
investigation through this study. Finally, through the analysis a comparison among the three categories of teachers is revealed.

**Opinions and Feelings about Computer Integration**

Teachers were asked to critique the current situation in terms of computer technology integration. Interestingly enough, low computer users reported that computer integration was a great idea, and a good move from the Ministry. On the other hand they strongly commented on the problems that the computer technology created as well as its disadvantages. Particularly, a low teacher computer user said “…we need to keep in mind that it is just a tool. It is another source of knowledge. We need to be careful how we use it, for what purposes and not make students become addicted to it.”

All teachers appeared to agree particularly on two points. Almost all of them said that 1) the model of one computer per classroom had not been working, and 2) the integration had not been done correctly. Regarding the first issue, two high teacher computer users said that the model of one computer per classroom could have worked better if the ministry had given more suggestions on how to use one computer per classroom instead of giving suggestions and materials aligned with situations where you should have more than three computers in the classroom. Two teachers characterized the situation as “controversial.” Moreover, two low computer users were critical of the fact that there was only one computer per classroom.

The second issue was broadly discussed by the majority of the teachers. Almost all of the teachers were very passionate that the innovation had not been
introduced correctly. The tone of their voice indicated their frustration. They did not like the way that the Ministry had applied the innovation. A high computer user said “..there are steps of introducing innovations and the Ministry has not applied any of those. It is a completely unorganized attempt without any long-term goals and effects. Unfortunately, the way computers have been integrated is neither useful nor purposeful.”

In addition to the above, the teachers complained that they were not adequately informed about the innovation. A moderate computer user said that they [Ministry officials] brought computers into the classrooms but they did not perform any other actions. For example: “…how and when to use it, or for what purposes and in what lessons…” A high computer user reported the following:

The computer is a very important and powerful educational tool, but it is impossible to fully take advantage of it due to the existing school system. We have too many problems to face and obstacles to overcome. Even though we have the tool [the computer] in the classroom there are no foundations or appropriate conditions to support its use as a tool in the classroom. The above is a result of the bad application of the project.

Finally, another moderate computer user said “It is as if pencils have been discovered and they [Ministry officials] brought us one into the classroom to use it with 25 students. It has been useful only for decoration purposes as they integrated computer technology right now.”
Use of the Computers in the Classroom

All of the teachers were asked to describe how they used computers in their classroom practices, or in other words how they assigned students to use computers for instructional purposes. All moderate and high users mentioned that the computer was a really important tool for them and they tried to use it as often as they could in their classroom practices. Due to a variety of difficulties, they pointed out that they did not use computers the way they wanted to nor as much as they wanted to.

I am using computer technology to achieve educational goals and develop students’ skills and abilities in mathematics, science etc. That’s my goal. I am not using computer to teach students computer skills. They acquire computer skills through the use of computers as tools, a high computer user mentioned.

The subjects to which computer technology was applied as well as the kind of use within and across the three categories of teachers varied. Teachers used it in different subjects, units, and for different purposes. Teachers mentioned that the decision when and where to use computers depended on many parameters. Those parameters could be the following: if the teachers had prepared materials in that particular subject/unit, or if they felt comfortable with a subject/unit because it was their major, area of interest, and/or expertise etc. Finally, there were three teachers who do not have their own class but taught specific subjects such as science, technology and design, geography, and arts and crafts in the 4th, 5th, and 6th grade. Those teachers reported applying computers in all of the subjects they taught.

Based on the “Evagoras” plan each school should have by now a computer per classroom in 4th, 5th and 6th grade and a lab. The above goal has been met but it does
not seem to function effectively. Teachers reported that the computer labs did not have computers for each student, and some of them were not equipped with any other kind of peripherals or equipment besides a printer and connection to the Internet. The classroom computers were not connected to the Internet. Additionally, teachers complained that some of the computers had different versions of software and some others did not even support Greek-named files or Greek characters.

The comments across the three groups of teachers regarding the use of the computer in the classroom and the visits to the lab varied. Many of the teachers mentioned that they used a combination of the classroom computer and the computer lab. They chose between the two based on the purpose of integrating the computer, subject/unit, activities, educational goals, as well as the current situation and the problems they had to face when they decided to use computers. The majority of the teachers used the lab more than the classroom computer. Three moderate and two high teacher computer users reported using only the lab. None of the teachers reported that they used only the classroom computer and not the computer lab.

**Use of Computers in Different Subjects**

Almost all of the teachers reported using computers mostly in Greek language and literature, mathematics, and science. Particularly, in the lesson of Greek literature and linguistics, teachers reported assigning students exercises related to grammatical, spelling, syntax phenomena, and punctuation. Moreover, teachers mentioned that students were asked to write poems, stories, essays, and responses to questions given by teachers. Finally, three teachers mentioned using computers for communicative exercises such as preparing invitations, tickets, and announcements.
The majority of the moderate and high users reported that through the application of computers they managed to achieve their educational goals more effectively and at the same time they managed to develop students’ computer skills. Most of the teachers reported using the exercises and in general the material and resources sent by the ministry in all three subjects (Greek literature and language, mathematics, and science). All high and six moderate computer users pointed out that they went beyond the material sent by the ministry and prepared their own.

In mathematics, three high and two moderate users mentioned that their schools’ PTAs bought educational software for them to use. All five teachers said that they bought and used AutoCad. Another four teachers (two high and two moderate) mentioned that they downloaded LOGO. Both groups of teachers (high and moderate computer users) prepared their own material to use. Another set of four teachers (three high and one moderate) reported preparing material in mathematics in collaboration with their colleagues at school. Particularly, a high computer user mentioned that they had formed a team in the school and they had developed exercises in M.S Excel that teachers of the 5th grade could use. They (informally) made available the exercises to teachers inside and outside their school. Finally, a moderate user mentioned that in a team with other three teachers they developed educational software in Mathematics for their own use.

In science, moderate and high computer users pointed out that they had used the educational software sent by the Ministry, which covered plants, animals and anthropology. Additionally, they prepared their own material in units where they believed they could better achieve their goals by using computers. Four teachers, (a
moderate and three high computer users) mentioned that they had used the educational software bought by their schools’ PTAs in science and especially in units related to electricity. Two high computer users mentioned using educational software in science that had been translated into Greek but they did not give any more information.

Four moderate and nine high computer users reported applying computer technology in other subjects such as geography, history, design and technology, and arts and crafts. Moreover, two high computer users mentioned using the educational software developed in their master degrees in history and geography. Finally, the computer applications used by the teachers in order to perform the above are M.S Office, materials/ software sent by the Ministry, Story Book Waiver, Kid Pix, and Sketch Pad.

**Internet Use, and Projects**

The internet was used by all teachers but for different purposes, and subjects, and with different frequency. Three moderate and seven high computer users mentioned using the Internet across different subjects to examine different concepts. Low computer users mentioned using the Internet mostly in order to present different materials to students, as an encyclopedia and some times to find information.

Specifically, moderate and high computer users reported that they had used the Internet to teach students to search, get the information they want, and download and save it on their computers. They gave students concepts and terms to investigate, or they gave them five to seven websites to look for specific information and answer questions or write essays and reports. They also discussed that their goal was to
develop students’ critical thinking, and selection and evaluation of information. The subjects in which teachers used the Internet most often were geography, history, science and Greek language and literature.

Six moderate and seven high computer users reported assigning students to do projects. Students worked on projects: 1) in different subjects; 2) across subjects in order to examine different concepts, such as traveling, planets, weather, and 3) for special events and purposes such as national and religious holidays, mother’s day, Olympic games, and European union (the last two were the goals of this academic year) etc. The Ministry also sent material for some of the national and religious holidays celebrated in schools. Additionally, teachers said that most of the time they prepared the material needed in order to have students use computers for a project. Finally, teachers mentioned that they had applied different computer applications to complete a project, such as M.S. Word, M.S. Excel, M.S. Power Point, and Internet.

**Computer Technology; Weak and Gifted students**

Besides the above, one more use of computers in the classroom was revealed. Some moderate and high users mentioned using computers to help weak students to improve. Four high computer users pointed out that they assigned extra exercises and activities on the computer to weak students to help them better comprehend some concepts, and not be left behind the rest of the class. In particular, they mentioned doing this in mathematics, and Greek literature and linguistics. In general, teachers reported that computers gave them the opportunity to assign exercises to students based on their level of knowledge and understanding. “Gifted, students get exercises
which give them the opportunity to go in depth, and weak students get remedial exercises that help them work more on the basics.” a high computer user said.

Moreover, teachers said that students can work on the computer by themselves and do not compare themselves with their classmates. This works for students that have low self-esteem. A moderate user concluded that “It takes away too much pressure and stress from the students and gives them the time, and freedom to be creative, without the stress that they are left behind.”

**Other uses**

Finally, more computer uses reported by the teachers are discussed below. Teachers applied computers for educational games, as a reward for good performance, as encyclopedias, for presentation purposes, as well as to organize their classroom boards (prepare posters, exercises and announcements). Moreover, four teachers pointed out that they used computers for activities outside the curriculum. In particular, they used computers to develop magazines with issues that students were interested in. Finally, two high teacher computer users reported applying computers for testing and assessment purposes in subjects such as geography and history.

**Skills Developed Through Computers**

Teachers commented on the skills and abilities that students developed while using the computers. Two low users mentioned that they did not feel that computers offered them the opportunity to better achieve their educational goals and develop students’ abilities and skills. Also, the other two low users pointed out that they preferred paper and pencil, handouts, and paperwork. They felt that they can better do
their work through the old-fashioned techniques, as they did when they were students.

On the other hand, a high user described the significant role of the computer:

   It frees you from the control you have in the classroom; you are becoming a facilitator, a coach. Your responsibility is to guide and help students because the control of learning is on students, you do not teach anymore but you guide students to learn by themselves, you do not control their learning anymore, they do!!.

   In addition to the above, moderate and high users summarized the reasons for applying computers in their classrooms. They reported that computer integration improved the teaching and learning process, motivated students, facilitated and promoted the development of important skills and abilities of students such as critical thinking, synthesis, analysis, and discussion.

   Along the same lines, moderate and high users reported that computers gave them opportunities to do a variety of exercises, and assignments that they could never imagine doing before. For example a moderate computer user mentioned “…in mathematics it makes the lesson more vivid, representative, and visual to the students.” A high computer user said “…when I use computers for science, students understand the concepts of electricity better.”

   Seven high and three moderate users discussed students’ actions, behaviors and attitudes when they used computers in the classroom. They commented on the fact that students enjoyed the time they used computers, and teachers managed to achieve their goals successfully by making students part of the learning and teaching process. Also, the above teachers believed that collaborative learning was achieved
through the use of computers. Besides the above some high and moderate users noticed that through computers students developed confidence in themselves. Finally, teachers commented that computers made students become more interested in their lessons and pay more attention to what was going on in the classroom. Specifically, a moderate computer user said:

The computer really helps me in the classroom. Every time we use it, students have fun, they enjoy it and they want to stay longer to work on their assignments. They are motivated and I am always so impressed by their behavior. They find it exciting, they learn without realizing it, and they discover things by themselves. The educational software combines entertainment, interactivity and you can achieve great results. Teachers will be amazed if they learn how to integrate computers in their classroom activities.

Factors that Prevent Teachers from Using Computers

Teachers were asked to discuss their views on the factors that prevent them from using computers in their classrooms. The way teachers responded to this question showed their frustration regarding the situation. In some cases they were very critical and passionate.

All of the high and moderate users mentioned that the way computers were integrated was the major problem. “…it depends on the teachers to apply computers; they are not ‘forced’ through the curriculum, that is why they do not use them that much in their classrooms”, a moderate teacher computer user said. Along the same lines, a high computer user pointed out that:
Teachers could use them more, if they were required to do so through the curriculum. It is UTOPIA to believe that teachers will integrate computers in their classrooms, since it depends on them to do it without any guidance, required equipment, materials, support, and evaluation. It means too much preparation by us, the teachers.

Teachers pointed out that because of the above, teachers are not willing to lose time, and risk not covering the curriculum or meeting the goals of the academic year in order to apply computers in their classroom practices. Also, teachers mentioned that the way computers had been introduced in the elementary classrooms was not aligned with the concepts of a centralized educational system and that created more problems.

Moreover, three high computer users mentioned that the system did not promote the idea of applying computers as tools in our school system. They supported that the officials referred to the integration as something that should be done, something that teachers had to do without realizing how to use it as a tool in the classroom, what its advantages were and what was needed to be done in order to be successfully applied in the classroom.

Finally, a general uniformity across the three categories of teachers revealed in terms of the factors that prevented them from applying computers in their classroom. Their responses tended to be the same across the board. Based on the above, five major categories of factors that prevented teachers from integrating computers in their classrooms can be summarized as follows: 1) lack of resources, 2) the tyranny of the curriculum, 3) incomplete and inadequate professional
development, 4) lack of support, and 5) other factors. Table H.1 (Appendix H) summarizes the factors and the frequency of each factor reported by the three groups of teachers.

**Lack of Resources**

The first major category revealed from analyzing teachers’ responses is the lack of resources. It is a broad category and includes a variety of sub-factors.

**One computer per classroom**

One of the major problems reported by teachers was the fact that there was often only one computer per classroom. A moderate teacher computer user said the following about the problematic situation:

It is completely useless; you cannot even use it as a presentation tool. I tried once to show something to the students, they were jumping around, there was too much noise, and I decided not to do it again, only if there was an immediate need.

Something else that created organizational and behavioral problems was moving to the lab. Teachers mentioned that due to the fact that there was only one computer per classroom, many times they had to move to the lab where there were more computers, but still not enough for all the students. They mentioned losing too much time from the teaching process and inability to control students. Another factor that contributed to the situation above was the number of students per classroom.

**Lack of Equipment**

Teachers also discussed the lack of other equipment, such as projectors or televisions. A lack of Internet filtering software was another issue mentioned by many
teachers as a method to protect students from getting in contact with inappropriate material.

**Not enough prepared material from the officials**

All of the teachers appeared to be very frustrated and really disappointed regarding the fact that they did not have enough material ready or prepared to use in order to apply computers in their classroom practices. The material sent by the technology team in Greek language and literature, mathematics, science, as well as for religious and national holidays, were insufficient in number and as a result they were not related to each other. A high user mentioned that even though the computer technology team had developed some materials, they did not provide teachers with any kind of guidance, “…where to use it, why, how, for what reason, what I am asking/expecting from my students, what my goals and objectives are.” Along the same lines, a moderate computer user said “…in the curriculum so far there are no guidelines, or lesson plans on how to incorporate computers in our practices. We need this kind of guidance in the books.”

**Material Preparation**

Teachers mentioned that due to the deficiency of enough prepared material, teachers had to prepare them by themselves if they wanted to use computers in their classrooms. Teachers complained that it was extremely time consuming to prepare material from scratch when they wanted to use computers. Also, two high computer users pointed out that the material sent by the ministry was not in good shape and they did not have the quality they had expected. Even though the teachers complained that it was a hassle to prepare their own material, some of the high and moderate
teacher computer users mentioned that they preferred to lose time to prepare their own material, instead of using the material sent by the ministry.

We do not have material that refers to specific units and goals in each subject of the curriculum. I keep asking myself how I am going to use computers in this particular unit, what activities I need to perform when integrating the computer as a tool in order to achieve the educational goals of the lesson, and much much more…, a moderate computer user concluded.

Another high computer use reported:

… on the one hand the ministry wants us to cover the curriculum, and on the other hand it wants us to use computers, without any support, guidance, without and any software and materials, nothing in the book and with one computer per classroom!! We cannot do both. These two do not go together.

Educational software language

Another problem mentioned mostly by the moderate and high computer users was the language of the computer applications and the educational software. A moderate computer user mentioned that “…a decade ago it was difficult to find educational software in Greek. But now there are a lot of interesting and extremely good educational software in Greek and unfortunately we do not have them in schools”.

Since the official language of the educational system is Greek, teachers said that they did not find it appropriate to use all material related to computers in English. Besides the above, fifth and sixth grade teachers mentioned that they did not have serious problems with the language. They explained that this happened because
students in fifth and sixth grade were more familiar with the English language due to the fact that they began learning English from the third grade, but still the majority of the material should be in Greek. “Even when you do search you need to write the word in English and for some kids this is not the best thing to do,” a moderate computer user completed.

_The Tyranny of the Curriculum_

Another factor given repeatedly by all of the teachers was that the system is curriculum oriented and there is too much pressure from the ministry (indirectly) and the inspectors (directly) to cover the curriculum. The low computer users reported this as a reason for using computers “Never” or “Seldom”, and the moderate and high computer users groups gave this as a reason for not using the computer the way they would like to and as much as they would like to.

“The volume of the curriculum does not permit you to do much besides that,” a moderate computer user said. Teachers mentioned that they did not have the flexibility and the time to think about anything else, besides covering the educational goals of the curriculum. Another moderate computer user elaborated on this issue by mentioning that:

…we cannot apply modern learning theories as much as we like because of the curriculum volume. We do not have flexibility to incorporate modern teaching strategies and techniques in our practices. Our schools are like universities. That is why our curriculum needs radical changes.

In addition to the above, seven high and four moderate computer users mentioned that in some subjects the books were too old and the methods were not
aligned with new teaching theories and strategies. Based on the above, many teachers admitted that there is a need for the curriculum to be revised. Consequently, in some subjects, such as Greek language and literature, radical changes are needed. A high teacher user pointed out the following: “there has not been any holistic innovation in the curriculum for a long time now. The only thing that is being going on is additions, completions and updates in terms of the subjects, concepts and methods.” In addition to the above, a moderate teacher computer user said that “…computer technology is not aligned with the entire philosophy of the curriculum.” The above shows that the curriculum cannot support and promote constructivistic learning theories and strategies. It does not give the teachers the flexibility to apply different kinds of learning environments.

As previously mentioned, teachers said that there was a direct pressure from the inspectors to cover the curriculum. Teachers elaborated on this issue by pointing out that the inspectors’ primary goal and focus was the coverage of the curriculum and the educational goals of the academic year. A moderate computer user said: “The first question the inspector asks is at what point you are in the curriculum, he compares you with the other teachers, and he comments if you are behind or not.” Besides the above, teachers mentioned that inspectors asked them if they had been using computers in their practices, and they recommended that they should use them. Many teachers reported that this situation did not make any sense because the volume of the curriculum and the curriculum itself (the content) did not permit the use of the computer.
**Incomplete and Inadequate Professional Development Training**

Another problematic area of the computer integration was teachers’ professional development training. The Ministry had organized a series of lessons in order to help teachers acquire computer skills, but many teachers reported that it did not work. “It was an unsuccessful, incorrectly planned training,” a moderate teacher computer user said. Due to financial difficulties and the lack of educated instructors the training was not completed. A high computer user wonders: “There are too many teachers that do not have basic skills in computers. How does the Ministry expect teachers to integrate computers in their classrooms when they do not know how to use computers?”

Related to the above was the lack of professional development in integrating computers in teachers’ educational practices. “Based on the fact that too many teachers do not have the knowledge and skills to use the computer as a tool in the classroom, the Ministry should have focused on this kind of training,” a high user said. Teachers complained that the ministry did not organize any kind of professional development focused on the above, not even a seminar to inform teachers about the materials they sent to schools. Teachers worked by themselves to become familiar with what the ministry had sent them to schools. This was time consuming as well. A high computer user pointed out that: “teachers need to be trained on how to integrate computers as tools in their teaching and learning process and also to realize and comprehend the value of the computers and what they can offer to them as teachers.”

Teachers mentioned another perspective of this issue that makes professional development training, even more valuable. Two high and four moderate computer
users mentioned that teachers did not use computers because they were afraid that students knew more than they did. They were afraid of getting embarrassed in front of their students because they were not as computer literate as the students. Finally, teachers mentioned that even though some teachers had the basic computer skills they might be afraid to use computers as tools in the teaching and learning process. They were afraid of making mistakes because they were not so familiar with the process of applying it as a tool in the classroom. “It is a matter of confidence for them to use computers in the classroom that is why they need training and practice”, a high computer user concludes.

**Lack of Guidance, Support, and Incentives from the Officials**

The next major factor mentioned by the teachers, was the lack of guidance, help, support, and incentives from the officials. The vast majority of the teachers interviewed felt really disappointed with the Ministry and specifically the technology support team.

All teachers across the three groups seemed to perfectly agree that technology coordinators did not provide adequate support to them. There was a general disappointment and frustration from the teachers. The problem was that the district coordinators team in each district did not have enough members to cover the needs of the schools. As a result, a technology coordinator visited each school only every two or three months. A moderate computer user said:

It is simple mathematics. It is impossible to visit all schools. There is a team of six people in our district. Two of them have bureaucratic issues to deal with, and the others work on developing materials and visiting schools. If we
had only 100 schools, there are four persons to visit all the schools, you get to see them only once or twice per semester, if you are lucky to see them so often. Moreover, some of the visits take place during breaks, and some others are not scheduled appointments. Technology coordinators appear in schools and any teacher that has time to chat with them and attend to what they have to say stays, otherwise teachers go to class.

A high computer user completes:

…when they come they [the technology coordinators] do not give us any advice regarding how to integrate the computer in the classroom, and how to use the material they have sent. Instead, they deal with technical problems. It seems that their role has become more like a technician than an advisor to us. We need guidance, help, and support in order to be able to integrate computers in the classroom.

As a result of the lack of guidance and support from the technology team and the ministry, a teacher in each school ends up doing everything related to computer technology issues. This situation was described by all of the teachers that had been interviewed. There was one teacher in each school who knew about hardware and software issues and dealt with all problems and situations related to computers. The above included technical problems, such as printing troubleshooting, incompatibility, networking problems, as well as giving advice to teachers on how to use computers as tools in their classrooms, giving help and material to help them plan their lessons, etc. Initially when computers were introduced, the Ministry asked schools to give four periods of the weekly schedule to a teacher interested in having this role. Last year
they gave only one period per week, and this year they decided not to give any. Some of the teachers continued to unofficially have this role and helped out their colleagues. But it was very time consuming and they ended up losing their breaks and any free time they had at school. Almost all of the high and moderate computer users mentioned that they had or they continued having this role. Moreover, the majority of them reported that they were not interested in continue not to have this role and they were trying to get out of it.

Another issue related to the above was teachers’ complaints regarding technical support. The teachers reported that when there was a technical problem, they could not get either a technology team member or an outsider technician to come to the school and fix the problem. Instead, the technology team representatives asked the teachers if someone at the school knew about hardware and software issues to take care of the problem. As teachers reported, this was very frustrating and created even more problems.

*Other Factors*

*Technical problems*

Teachers reported facing too many technical problems in the lab, as well as with the classroom computer. They mentioned both hardware and software problems. Particularly, they reported problems with the internet, computers’ networking, and different versions of computer software. They also mentioned that sometimes the software was not compatible with all computers, and some of the computers did not support Greek file names or the Greek language in word processing documents.
Students’ computer literacy level

Teachers commented on students’ different levels of computer literacy as another problem in the process of integrating computers. Particularly, a moderate computer user argued that “…some of the students do not even have the basic computer skills. You spend too much time to teach them how to use computers and at the same time you try to cover the curriculum and achieve your goals.” Especially teachers in rural schools complained strongly about that because students in those areas did not have the opportunity to attend private afternoon computer lessons as the students in urban areas. The complaints regarding this factor came from low and moderate teacher computer users.

High computer users did not complain so much about students’ computer illiteracy, but instead they reported about trying to find out ways to overcome this obstacle. Among the solutions they mentioned were the following: preparing handouts with basic commands, and notes regarding different computer applications; so students could refer to the handouts when they had a problem. Additionally, teachers said that they had the computer literate students to help them teach the rest of the class some basic computer skills, and in each group one student was computer literate in order to help the others in the group.

Not realizing the use of computer as an educational tool in the classroom

The majority of the moderate and high computer users argued that ministry officials did not realize what it meant to use the computer as a tool in the classroom, nor did they know how to use computers themselves. Many ministry officials and educators had the impression that computer integration in schools meant to teach students computer skills, introduced it as a subject matter.
A high computer user wonders: “Since the inspectors do not understand the concept of computer integration as a tool; how will they evaluate computer technology integration by teachers; how will they guide and help them?” A moderate computer user said that the inspectors recommended them to try to use computers. In particular, they [inspectors] say:

...ask students to find something on the internet, present materials to the students, type an essay or a poem etc. But is this the purpose of integrating computer technology? Does integration mean to show pictures or do Internet searches? Computers integrated as tools in the classroom are much more than encyclopedias or sources of information.

Finally, a high computer user mentioned that “…the Ministry officials are too old [agewise] and they cannot evaluate the demands of the Information Technology society we are living in. They cannot interpret and put into practice the demands of the Information Technology society.” The above shows that people who have the power to advocate for computer technology integration view computer as a tool that supports traditional classroom practices and not as the medium to create new learning environments where the way teachers teach and students learn can be transformed and revolutionized.

In addition to the above, there were some educators that did not realize the value, importance, and need of integrating computer as a tool in the classroom. Also, teachers were not convinced that they could cover the curriculum goals through computers and how useful they could be to their practices. A high computer user said that:
…the teachers have not been trained. How can they realize the importance and value of the computer if they do not know how to use it as a tool in the classroom? Nobody showed them what they can do with the computer.

Factors that Facilitate Teachers in Using Computers

Teachers also reported on the factors that facilitated them in using computers in their classrooms. Twenty teachers out of twenty two mentioned that they were able to integrate computer technology in their classroom practices thanks to their computer literacy. Only two low computer users mentioned that they did not consider themselves computer literate. This was the reason why they did not use computer technology that much.

In addition to the above, a total of nine teachers reported that being further educated in fields related to computer technology helped them to integrate computers in their classroom practices. Those nine teachers reported that they had certificate or master degrees in Computer Science, Engineering, Computer Technology in Education and Information Technology in Education. In addition, eleven teachers mentioned that they attended classes during their studies where they used computers as tools in their contexts. Most of them said that they had attended only one class in a specific subject and they did not have anything like that afterwards. Also, the majority of the teachers mentioned that they had attended classes in acquiring computer skills in their college program of study. All of the low computer users reported that the professional development organized by the Ministry in acquiring computer skills helped them in deciding to use computers in their classroom practices. Finally, three
moderate and six high computer users mentioned that their knowledge in hardware and software issues made them feel more confident and as a result they used computers in their classroom more often.

Two moderate and two high users were able to integrate computers in their classroom practices because their schools’ PTAs bought educational software. All of the high and five moderate computer users mentioned that their belief that the computer is an extremely important tool for students to possess, made them use it in their classroom practices. A high computer user particularly said:

…we need computers whatever we do in our lives. I do not want my students to be caught by surprise. Even to check their bank accounts they need to use the Internet. As an educator it is my responsibility to help students realize the value and importance of computers in their lives. In the society we live in it is a necessity to possess computer skills, and not an extra qualification.

The above quote captures the essence of computer technology integration in the classroom. It shows that computer technology has become part of our lives and educators are responsible for developing these kinds of attitudes towards the use of computers. Besides the above, a moderate and two high computer users did not have their own class but they taught different subjects such as science, technology and design, and arts and crafts. Those teachers integrated computers in all of the subjects they taught.

A high computer user was the only one that reported getting help from the district coordinator. She talked about her experience with the coordinator and how that helped her to integrate computers in her classroom practices:
…when you get into the classroom if you do not have an expert to help, support, and give you the basics; it is impossible to make it happen. The first time you enter the classroom with the intention to use computers, you face too many problems that you are feeling that you are losing your time, and you are unable to achieve what you want. You are ready to give up and stop any further attempts. I had these feelings!! The coordinator was there, stood by me in the classroom and helped me out. I felt more secured and confident. I saw how he approached and solved the problems that appeared. That’s it!!! You can do it, you still need help but it is not as the first time, you need that person at the beginning to be with you to support and guide you in the classroom.

Her comments showed how valuable were the coordinator’s help, support, and advice. This is the kind of support teachers expect to have from the district coordinators in terms of computer technology integration in the classroom.

A factor mentioned in the literature (See Chapter 2) that positively influenced computer integration in the classroom was teachers’ instructional philosophies. This factor was not reported by the teachers but the author examined it through the interview questions. The analysis of the interviews reveals that the literature’s findings are supported by the results of this study. The literature suggests that teachers who apply modern learning theories in their classrooms, and consider themselves constructivists are more likely to integrate computers in their practices than teachers that follow more traditional ways of teaching.

Three of the four teachers that have been classified as low computer users reported that they considered themselves as traditional teachers. They said that they
preferred using lecturing because students learn better through listening. They used teamwork and collaboration among students but not that much and so often.

All of the moderate and high computer users classified themselves as progressive, trend-setters, and innovators. They liked establishing, incorporating and defining new ways and methods in their practices, and the school environment in general. They liked taking initiatives, responsibilities in order to bring innovations in the school setting. On the other hand, they mentioned that they “respected” the traditional ways of teaching. They used them in combination with the progressive and modern learning theories. They reported applying a mixture of traditional and progressive methods of teaching and learning, they tried to “marry” the two approaches.

In general, moderate and high computer users mentioned that they did not lecture too much and they tried to avoid it when it was possible. They liked teaming up students in order to promote collaborative learning as well as include them in the teaching and learning process. Finally, five teachers (two moderate and three high computer users) mentioned that the philosophy that underlined their teaching was to get into students’ thinking, and make the lesson understandable, interesting, and applicable in students’ real life. They focused on giving students experiences that would help them later on in their lives.

Most of the moderate and high computer users discussed the role of the school in relation to the development of students’ personalities. Those teachers mentioned that as educators it was their responsibility to educate students. By education they did not mean to give them knowledge, but to help them successfully develop their
personalities and become respectable, responsible and successful citizens in the society.

**Teachers Think: What Should Be Done**

There were some teachers that had a clear idea in their minds of what should be done in order to improve the situation. The majority of the high and moderate computer users gave specific plans of actions and series of steps of what should be done. In general, teachers’ suggestions were in agreement across the board.

Some of the high and moderate computer users mentioned that computer technology integration should be part of a holistic change of Cyprus educational system. Along the same lines, a moderate computer user mentioned that

…computers have to be integrated in relation to other changes such as educate teachers, change methods and approaches in the curriculum, develop appropriate materials, fewer students and more computers in the classroom, make computers part of the curriculum, and part of the books.

A high computer user said that “If we want to change things in order to make them better, we have to holistically approach them. We cannot make small changes and corrections in a project that has basic foundational problems. We need radical changes!!”

**Enhance the Technology Team**

Four high computer users suggested that first of all, the Ministry should enhance the technology team that was responsible for the computer technology integration. They said that the officials needed to make sure that the team had people
majoring in computer technology in education, computer science or relevant fields. Moreover, teachers supported that the technology team needed academics and policymakers who would be responsible to develop a state policy related to the innovation. The team should develop a plan and a common framework to integrate computers in the classroom, after they had evaluated the situation first. This process should start as soon as possible.

*Change of the Philosophy*

In addition to the above, teachers feel that the philosophy of computer integration should change. It should not be up to teachers to use it, but teachers should be “forced” to use it through the curriculum. Almost all of the teachers supported that the use of computers should be part of the curriculum. They mentioned that the team responsible for the technology integration needed to introduce computers in the curriculum by developing specific lesson plans, assignments, exercises, even educational games in the books of each subject, in each grade. The above should be associated and aligned with the goals and educational objectives of each subject/unit.

A moderate computer user pointed out that “We will know when, how, and why to use it; what the goals we want to achieve are when applying the computers. We need prepared materials to use. In this way it will be clearer and easier to integrate computers.”

In addition to the above, two low, five moderate, and four high computer users suggested that there was a need to introduce computers as subject matters along with the use of computers as tools. They supported that students ought to acquire basic computer skills as well. Some teachers made specific recommendations on this issue.
They mentioned that especially at the first two or three grades we should introduce computers as a subject in the weekly schedule. Both approaches should work together through the revised and adjusted curriculum. Moreover, teachers supported that the educational system was responsible to provide students with the basic computer skills since it is a necessity in order to survive in the society we live in. A high computer user mentioned that:

…we need to have classes where students will be taught how to use computer applications because otherwise we observe phenomena of social and cognitive inequality. Some students have the opportunity to have computers in their homes, attend afternoon computer classes, get help from their parents; and some other students do not have this kind of help and support. The Ministry should offer them this opportunity.

The above brings me to the next issue that teachers commented on, the volume of the curriculum. They argued that the curriculum needed radical changes and revisions. Specifically, a high computer user mentioned:

We need to get rid of some of the curriculum. This will free us from the pressure of having to cover all that curriculum and not being able to do and think anything else besides that. Ministry officials need to revise and make the curriculum appropriate for applying modern and progressive teaching techniques and strategies.

Teachers supported that revising the curriculum also meant revising the books in each subject. They said that Ministry officials needed to integrate technology in the
books by incorporating suggestions, guidelines, and directions on how to use computer technology in each subject/unit.

*Lab, Classroom Computers and Equipment*

All of the teachers agreed on having a well equipped lab where each student would be able to be seated in front of a computer, all computers would have the educational software needed to perform lesson’s activities, a projector, a television, networking, printers, internet connection, internet filtering software, and the same versions of software in order to perform the required activities in all computers. Moreover, they mentioned that there was a need for more computers in the classroom, probably four or five. The classroom computers as well as the classrooms should be also equipped with the above. A high computer user mentioned that by “having five computers per classroom, you are able to team up students, and by using rotation you can achieve besides the goals of the lesson, collaborative learning, higher order learning skills, as well as computer skills.” Along with the above, teachers also mentioned that they would like to have fewer students in the classroom.

*Educational Software*

Another issue that teachers discussed was the educational software and the computer applications needed to be used in order to integrate computers in the classroom. Teachers recommended that the technology team should develop or buy educational software and computer applications appropriate for all grades and subjects.

They recommended that the materials needed to be aligned with the curriculum and integrated in the curriculum as choices, alternatives to the teachers. A
high computer user suggested that the Ministry should recruit a team of people that are educated in computer technology in education or related issues, in order to select/choose, develop or translate educational software/computer applications in all grades and subjects. Additionally, teachers suggested that the technology team needed to identify and recruit teachers that were educated in computer related fields. A moderate computer user recommended that “teachers that have computer science degrees or masters in educational technology could have been designing and developing educational software and thus become part of the extended computer technology integration team.”

**Professional Development**

Professional development is the following critical subject highlighted by the teachers. “If they integrate computers in the curriculum and they ‘force’ us to use computers, they will have to educate us first,” a low computer user said.

There was a general agreement among the teachers that there was an immediate need to be professionally trained. First of all, teachers said that they should attend classes in order to acquire computer skills. “Especially veteran teachers that did not have the opportunity to attend computer classes through their college years, they need to have this kind of training”, a moderate computer user mentioned. Some teachers also reported that the professional development training in acquiring computer skills should be organized based on teachers’ different levels of computer skills.

Secondly, teachers reported that they should be trained in order to develop knowledge, skills, and abilities to integrate computer technology in their classroom
practices. Many of the high computer users pointed out that it was extremely important for teachers to realize through professional development training the value and importance as well as the benefits and practical applications of computers in the classroom. Teachers also pointed out that the professional development should be continuous. It should become an ongoing process, not just a series of sporadic or disjointed events. A high computer user mentioned the following:

Through prepared material and professional development the ministry could give incentives to the teachers. At the professional development they need to demonstrate the computer applications, and the educational software. Additionally, they should give specific guidelines on how to use computers in the classroom and what are the strategies and techniques need to be used. Teachers are not negative to use computer technology but the officials should provide them with what is needed.

**Technology Coordinator and Technicians**

All of the teachers highlighted the important role of the technology team and the district coordinators. Teachers strongly discussed that they needed advice, help, support, and guidance. Specifically, high and moderate computer users mentioned that the coordinators should focus on the pedagogical aspect of computer technology instead of the technical aspect. “They need to be advisors, consultant to teachers, give ideas and guide them through the process of integrating computers in the classrooms and not just resolve technical issues”, a moderate teacher concludes.

Teachers also pointed out that coordinators should visit schools frequently, at least twice a week. Coordinators should have the time to talk with the teachers, get
their concerns and questions as well as evaluate computer integration. Finally, teachers suggested that a team of technicians should be recruited in order to provide quality and immediate technical support to the teachers in the schools.

**Evaluation**

Moreover, teachers mentioned that it was extremely important that they were evaluated on how they integrate computers in their classroom practices. They said that in order to achieve the above the inspectors should have the knowledge and skills to evaluate teachers while using computers in their classrooms. They suggested that the inspectors needed to be educated and trained regarding computer technology integration.

**Computer Technology Teacher-Leaders in All Schools**

Finally, the majority of the high and moderate computer users identified the need for a computer technology teacher-leader in each school. They said that those teachers should be computer literate and have knowledge and skills in computer technology integration, as well as in hardware, and software issues. Their role would be supplementary to the technology coordinators’ role. They would provide daily support and advice to the rest of the teachers on issues related to computer technology integration. Teachers suggested that teacher-leaders ought to have time in the weekly school schedule specifically for these purposes.
The Future of Computer Technology in Cyprus Elementary Schools

Regarding the future of computer technology integration in Cyprus elementary schools, the researcher grouped the teachers in two categories: the optimists and the pessimists.

*The Optimists*

The optimistic group mentioned that in general they should move on and they should be able to “fix” the situation and make it better. They also pointed out that they should have more computers in the classrooms, more equipment, prepared material and a variety of educational software.

Many of the teachers reported that when the old teachers retire, the new ones that would come in would have the knowledge and skills on computers and they would also realize and understand the importance of using computers in the classroom. The new teachers would be more familiar with the computers, they would use them daily and that is why it would be easier for them to accept and integrate them in their teaching practices.

*The Pessimists*

The pessimistic group of teachers mentioned that the situation would stay the same; they would continue to have one computer per classroom. Maybe the labs would be better equipped with more computers. “.. we are moving too slowly, and we are not making any progress. In addition, there is no motivation for the teachers to use computers”, a moderate computer user explained. Teachers mentioned that many of their colleagues had not been convinced that computers were important tools to be
used in the classroom. Teachers also reposted that we were not working on the correct foundations and that the Ministry had made incorrect and worthless moves.

There were some really pessimistic teachers. A moderate computer user mentioned:

I do not want to imagine the situation in ten years from now. Everything has been done in the wrong way and I am afraid the situation will stay the same. There are too many problems such as lack of coordination, time, energy and training, lack of seriousness, organization and professionalism.

Finally, a high computer user said that the situation will change if the state policy changes. The teachers supported that this was difficult because the officials that had the power in their hands “…are narrow-minded, old, bureaucrats, and it is difficult for them to go away until their retirement.” As a conclusion, I would like to mention what a moderate computer user said:

Without an organized plan and a different approach, the situation will not get better and everybody will teach what ever they want. So far there is an uncertainty about the future. In ten years from now we will be in a better situation, but too many problems will exist because we do not have strong foundations, and the situation is out of control.

**Overview of the Findings**

To conclude this chapter, the main points which appeared through the interviews are highlighted below. In general, teachers appeared to be very frustrated
and disappointed in terms of how computer technology had been integrated. They described how they applied computers in their classroom practices or in other words how they assigned students to use computers in the classroom. Teachers reported using a combination of the classroom computer and the computer lab, but more they used the computer lab. They used computers in different subjects such as Greek language and literature, mathematics, science, geography, history, design and technology, and arts and crafts.

A general uniformity across the three categories of teachers revealed in terms of the factors that prevented or facilitated them to apply computer technology in their classroom practices. The factors that prevented computer integration can be summarized as follows: 1) lack of resources, which includes the following: one computer per classroom, lack of equipment, not enough prepared material from the officials, material preparation, and educational software’s language, 2) the tyranny of the curriculum, which includes the volume of the curriculum and the direct pressure from the inspectors to cover the curriculum; 3) incomplete and inadequate professional development training, 4) lack of guidance, support, and incentives from the officials, and 5) other factors, including technical problems, students’ computer literacy level, and the fact that some teachers and policymakers do not realize the use of computer as an educational tool in the classroom.

On the other hand, the factors that facilitated teachers can be summarized as follows: teachers’ computer literacy, teachers’ education beyond bachelor in fields related to computer technology, teachers’ training through their college program of studies regarding computer skills and integration of computers as tools, the support of
their schools PTAs, the help from the district coordinator, the professional development training organized by the Ministry of Education, teachers’ knowledge on hardware and software issues, their beliefs that the computer is an extremely important tool for students to possess, and their instructional philosophies (i.e. teachers that apply innovative techniques and student-centered environments).

Finally, teachers commented on what should be done in order to improve the situation. Teachers’ suggestions that were in agreement across the board can be summarized as follows: 1) enhance the technology team, 2) change of the philosophy of computer technology integration, 3) the need for labs, classroom computers, and relevant equipment, 4) the need for educational software, 4) educators professional development and training, 5) enhancement of the role and responsibilities of the technology team and the district coordinators as well as the immediate need for technicians, 6) evaluation of computer technology integration in the classrooms, and 7) identification of technology teacher-leaders in all schools.

Finally, teachers were identified in two categories regarding the future of computer technology integration in the Cyprus educational system: the optimists and the pessimists. The optimists supported that we would move on and improve the situation. The pessimists mentioned that the situation would not get any better, and it would not change until the state policy changed, an organized plan, and a different approach were developed.

The final chapter of the proposed study, Chapter 6, discusses the findings of the study, presents the implications for policymakers and educators, recommendations for future research, as well as the limitations of the study.
CHAPTER 6 – DISCUSSION OF THE FINDINGS, IMPLICATIONS FOR THE POLICYMAKERS AND EDUCATORS, RECOMMENDATIONS FOR FURTHER RESEARCH, AND LIMITATIONS OF THE STUDY

Introduction

This study examined how Cypriot elementary school teachers use computer technology in their classrooms, the factors that influence their use, the factors that promote or inhibit them from becoming integrated into instructional activity, and from being used in transformational or constructivist ways. These questions were addressed based on quantitative and qualitative data gathered from a sample of Cypriot teachers in which high, moderate, and low computer use teachers were identified. The analysis was thus also able to examine differences in the responses of teachers by their level of computer usage.

Discussion of the Results

Overall, the findings of this study support Cuban’s (1986; 2001) findings about the relative insignificance of the computer in daily classroom instruction and about the difficulty of incorporating computers as a regular classroom feature. Interestingly, although Cypriot teachers appear to use computers frequently for personal reasons, the present study indicates a number of attitudinal, professional, and organizational factors that work to inhibit them from using and integrating computers into their classrooms. When teachers do use computers in their classrooms, they tend to do so in ways that are rather restricted and traditional, more like high tech
chalkboards or as “extras” than as learning tools. The findings suggest that, at best, students in these classrooms are more likely to “learn from” or “learn about” computers than “learn with” them (Becker, 1993; Cuban, 1986; Cuban & Pea, 1998; Jonassen, 1999a; Trotter, 1998). Few teachers were found to use computers in any sort of constructivist or progressive way. The traditional (common)/ transformational dichotomy that runs as an implicit theme throughout the existing literature, is applied as well in the Cyprus elementary context. A variety of factors that explain the kind and frequency of computer use in Cyprus educational system is discussed below.

**Professional Factors**

The present study indicates that while teachers may be well able to use and even teach with computers on a personal or individual basis, they lack the knowledge and skills needed to incorporate computer technology on a classroom-wide basis. Along the same lines with the existing literature (Becker & Ravitz, 2001; Carvin, 1999; Dexter, et al., 1999; Earle, 2002; Honey, 2001; McKenzie, 2001), teachers report a substantial lack of both pre and post service training and development courses, aimed at explaining how to integrate computers into instruction in any regularized fashion, as well as acquiring computer skills. Teacher educational background was found to be a significant predictor of classroom computer use, but only 22% of the teachers sampled possessed a Master’s degree.

It is interesting, however, to find a significant link between teachers’ level of professional behavior and the degree to which they use computers in their classes. Teachers who were more active, assumed more responsibility in their school, and maintain good relationships with their colleagues tended to use computers more
frequently. This is consistent with previous studies (Becker and Ravitz’s, 2001; Berg, et al.,1998; Carvin, 1999; Dexter, et al.,1999).

Somewhat surprisingly and inconsistent with previous studies (Becker & Ravitz, 2001; Becker & Reil, 2000; Carvin, 1999; Dexter et al., 1999; Earle, 2002; Ertmer, 1999; Jonassen, 1999b) is that no link was found between computer usage and the tendency of teachers to support transformational instructional practices such as constructivist or student centered learning. It may be that teachers conceptually distinguish the idea of computer integration in learning from the idea of constructivist learning. Of course, another explanation could be that the level of professional training (along with the lack of organizational support to be discussed below) is simply inadequate to allow computers to be used in constructivist ways.

Organizational Factors

The organizational factors to computer usage appear to fall into three main categories; structural, normative, and resource-related. With regard to structural factors, it is clear from the interviews that teachers are severely impeded by a “tyranny of the curriculum,” that is, a high volume of educational material to be covered and a demand by education officials that it be covered on a regularized nationwide basis. Like many educational systems around the world, Cyprus relies on a system of national standardized tests for determining educational opportunity and attainment. A tremendous “gravitational force” thus exists that discourages Cypriot teachers from taking risks or loosening the reigns over classroom processes.

Another structural factor emerging from the interviews concerned the low level of support and assistance teachers reported receiving from local and district
technology coordinators. Lacking regular support, teachers would be more likely to place less priority on computer instruction.

Of course, this lack of support also contributes to a normative factor against the use of computers in the classroom. In addition, teachers reported little in the way of professional or social networks, either formal or informal, that supported classroom technological innovation. In short, the teacher responses suggest that professional culture and school climate are unsuited for promoting instructional change. Somewhat of a surprise, however, is the relatively low importance teachers placed on principal leadership as a factor in promoting classroom computer usage. This might suggest that principals are viewed more as managers than as instructional leaders and as having little relevance with regard to classroom instruction.

Finally, and perhaps most importantly, the teacher interviews reveal a marked lack of resources. In addition to the absence of human resources mentioned above (in the form of local and district support personnel), teachers cited having just one computer per classroom, a lack of other necessary equipment, a lack of prepared materials from district and ministry officials, as well as a lack of necessary Greek language software. Lack of resources is discussed as well by the existing literature as a barrier in computer technology integration (Becker & Ravitz, 2001; Byrom, 1998; Cuban & Pea, 1998; Dexter, et al., 1999; Duffield, 1997; Earle, 2002; Ertmer, 1999; Gahala, 2001; Honey, 2001). Teachers also reported that they were not granted the time necessary to prepare computer-oriented lessons. Adequate time was provided neither within the curriculum nor within the school year for teachers to grapple with the problem of how to effectively integrate computer technology into their teaching.
Attitudinal Factors

Teacher attitude toward the computer as a classroom tool was found to be a significant predictor of classroom use. Teachers expressing skepticism about the value of computers in the classroom tended to use them less frequently than other teachers. This is consistent with prior studies (Berg, et al., 1998; Carvin, 1999; Dexter, et al., 1999), and may help explain why classroom computer usage remains limited even in “technology rich” schools (Zhu, 2003).

Implications for the Policymakers and Educators

The personal, professional and organizational factors shed light to the existing situation in Cyprus elementary schools: they explained the low frequency of computer use and the preference towards the traditional approaches. Having in mind the previous, is there any reason to expect that this situation will change? So far the situation created in Cyprus educational system does not seem to facilitate and promote computer technology integration. The project responsible for computer integration, Evagoras, has not been successfully applied in schools and none of its five portals have been fully implemented during the three years of its application. Moreover, the project does not seem to produce the results the authorities expected to have had. Even though the team responsible for its implementation had clear goals of what to achieve through the integration, they had not developed a strong foundation to support these goals.

The factors discussed above that function as barriers, reveal up to a degree the problems that exist throughout the system in terms of computer technology integration. It shows that too many aspects of the system either directly or indirectly
related to computer technology integration are dysfunctional. In total, these barriers raise serious doubts about the value or even the possibility of merely “introducing” computer technology into schools. If the barriers described were not present, would we expect to see different teacher behavior? But, is it possible for all the barriers to be eliminated?

If teachers believe that their traditional technology is reasonable, effective, and efficient, they are likely to resist implementing computer innovations. This would be particularly true when teachers lacked the knowledge and resources needed for successful innovation. Is there anything that can be done in order to enable teachers to develop more positive attitudes towards using computer technology in their teaching? What can be done in order to expand teachers and students’ experiences with computer technology? One message seemed to emerge time and again from the teacher interviews: to paraphrase, “we simply don’t know how to do this.”

On the other hand, questions revealed as to whether the situation can be improved; even though the results of the study are not very encouraging. What kind of new policies might be able to improve the situation? How these policies can improve the situation?

The findings of the study, and consequently the questions and dilemmas raised, call for immediate and direct action from the policymakers and educators. They need to take into consideration the information revealed from the study and decide how to move on. It is important to consider the questions and dilemmas revealed through evaluating computer technology integration in Cyprus educational system before planning the next steps.
Policymakers and educators need to ask themselves if it is possible to overcome the barriers that prevent teachers from integrating computers in their practices. Along the same lines, they need to examine if it is feasible to provide teachers the material and human resources related to computer technology integration. Otherwise, policymakers and educators should consider applying computers as subject matters in elementary schools. Computers will not be needed in the classrooms, instead a fully equipped lab will do. Computers will be taught as subject matters like mathematics, science, etc, and they can also be used as tools when teachers feel is necessary and appropriate. Computers will be an additional learning tool, and not a regular classroom feature. As teachers use in their own discretion when they feel it is necessary different innovative and student-centered techniques, they should do the same with computers. The above describes the philosophy that might guide computer application in schools and implies the need for the development of new policies.

**Questions for Further Study**

Interesting and critical questions raised and major dilemmas revealed regarding the future of computers in the schools that deserve further study are discussed below. Are computers an effective classroom tool? Is it feasible to apply computers as a regular tool in the classroom practices, in a real integrated way? Is it better to have computers only as subject matters in schools? Does computer technology promote students’ learning and achievement when integrated in a real and meaningful way that explains the need of making further attempts to apply computers in schools? It may be that given the expense in terms of hardware, software, and
training, it is impractical to expect that computers will be integrated into classrooms. This is not to say they have no place in schools, but this place may be more comparable to an “electronic encyclopedia” than an “active learning” tool. Should we abandon any kind of attempts to integrate computers as regular tools in schools curricula? Should computers be used for only testing and assessment purposes in schools? It might be better to use computers not as a regular or active learning tool, rather as a tool that teachers can use when they feel is necessary and appropriate, as they do with the television, video, radio, etc.

Furthermore, research should be also conducted in investigating new methods of technology that can be used as tools in the teaching and learning process. Technology has rabidly changed during the last years, and computers are not the only medium that can be used as a teaching tool. For example, cell phones can be considered as a future teaching tool in the schools. Computers might also be approached differently from the way they have been so far.

Is computer learning necessarily linked to constructivist or transformational learning? Someone might articulate that if the goal is to promote constructivist learning techniques through computer applications, wouldn’t be better if we abandon the attempts to integrate computers and work directly towards applying constructivist techniques? Would “progressive” or constructivist minded teachers be better off to skip the computer altogether, and work constructivistic learning activity into regular class activity? It may be that teachers interested in pursuing more progressive types of activity can do so without relying on computer technology. Would it be an interesting
future study to look at how teachers try to create these kinds of learning experiences
besides computer usage?

Are teachers’ attitudes toward progressive methods necessarily tied to their
attitudes toward computers? Many studies found that they are related, but it does not
mean that the one predicts the other. It may be that teachers conceptually do not relate
their attitudes towards innovative teaching methods and their attitudes toward
computers. Based on the above, they might not feel that by applying computers they
can develop progressive and student-centered learning environments.

Are highly centralized, test-driven school systems even capable of
implementing transformational classroom practices? The structure, norms, culture,
and values of the system do not seem to allow or make it easy for the teachers to
apply transformational classroom practices. A representative example is the “Tyranny
of Curriculum”. In this study it appears to function as a strong barrier for teachers to
apply computers in their classroom practices. It would be really interesting to
examine if the curriculum is such a powerful, such as DNA, to inhibit computer
integration.

Limitations of the Study

In retrospect, there were a number of limitations that may have contributed to
less detailed findings and lack of generalized conclusions. First of all, for reasons of
convenience, only teachers where asked regarding computer technology integration.
In order to fully evaluate and assess the readiness of the system, besides teachers;
students, parents, principals and representatives from the Ministry should also participate in the study.

Even though the system is centralized, and homogeneous, and to some extent the results were generalized; selecting teachers from only one district still consists one of the study’s design limitations. Besides the above, the researcher identifies the need for a study where teachers from other districts will participate as well. However, the district chosen to get the sample from contains the largest portion of the island’s population and consequently the largest portion of the teachers’ population.

Another major limitation of the proposed study is the translation that took place from the Greek into the English language and vice versa. Since the survey’s sample is the elementary teachers in public education where the official language is Greek, it was more appropriate to translate the instruments into the teachers’ native language. This was really a great challenge because the investigator needed to be extremely careful with the translation in order to give the right messages and responses given by the teachers as well as appropriately address the concepts and terms that were discussed through the study. To address the limitation above, the translation process was conducted with the help and support of the Evagoras team, including English literature teachers and University professors, as well as with the help of a professional organization (public authority) responsible for making translations from Greek into any other language and vice versa. The above happened because the researcher has to write its dissertation in English. Future studies will be most probably conducted in Greek; therefore this limitation will be eliminated, or
minimized since there is the possibility of translating the studies in other languages in order to make the results available to other researchers, policymakers, and educators.
REFERENCES


APPENDIX A

THE FACTORS THAT INFLUENCE TEACHERS IN USING COMPUTER APPLICATIONS IN THEIR CLASSROOMS (AS PRESENTED IN THE LITERATURE)

External (First – order Factors)

- Adequate and continuous professional development in acquiring basic computer skills and learn how to use computer applications (enhancement of computer literacy)
- Adequate and continuous professional development in computer-curriculum integration
- College classes in acquiring basic computer skills and learn how to use computer applications
- College preparation in computer curriculum integration
- Participate in seminars and workshops regarding computer technology integration
- Positive school environment
- Supportive school leadership - principal’s beliefs, attitudes towards computer integration as well as support and involvement
- Adequate technology resources: access to hardware and software, number of computers in the classrooms
- Adequate time for preparation and implementation
- Appropriate assessment and evaluation of the integration – teachers’ coaching
- Continuous technical support and technical assistants
- Funding

Internal (Second-order Factors)
- Teachers’ views, beliefs and attitudes towards computer uses in students lives and towards computer integration into schools
- Teaching philosophy - favors constructivist-oriented teaching practices and in general teachers’ attitudes towards modern learning theories
- Teachers’ role - coach, facilitator, lecturing, tutoring, provide scaffolding, partners with students etc
- Instructional practices – teachers that focus on knowledge construction, “hands-on” assignments, use of problem based learning, case-based learning, anchored instruction, reflective inquiry, web-based learning etc
- Classroom environments – teachers that set up student-oriented classroom environments and promote active participation of the learner, develop collaborative, active and authentic learning environments, open learning environments and transforming classroom into learning communities etc
- Students and Learning – teachers that promote social learning, increased interactivity and collaboration among students, making learning more meaningful to students etc
- Students and Skills – teachers that emphasize on higher order skills, critical thinking, problem solving, decision making skills etc
- Relationships with peers - increased interaction and collaboration with peers
- Teachers’ views of learning and the way that a teacher learns – if he/she is life long learner, social learner, constructs knowledge etc
- Teachers involvement with the system - active system participants, decision makers, take over leadership roles and work on committees
- Teachers’ professional engagement – active in their profession, attend workshops, involvement, willingness and attitudes towards professional development and trainings
- Teachers’ age
- Teachers’ computer literacy level
- Teachers that are early adopters of new ideas, reforms and practices, highly motivated and eager to learn new technologies that will change the way they teach and enhance students’ learning and achievement.
- School culture – social network of computer-using teachers in the same school
- Teachers’ personal use of computer applications (besides school)
  - computers, connection to the internet, computer labs, desks for computers
    in the classrooms, printers, projectors, scanners, speakers etc
APPENDIX B

CONCEPTUAL FRAMEWORK / DIAGRAM

Figure 1
Conceptual Framework

![Conceptual Framework Diagram]
APPENDIX C

THE FACTORS THAT INFLUENCE TEACHERS IN USING COMPUTER APPLICATIONS IN THEIR CLASSROOMS (AS SUGGESTED BY THE STUDY)

Personal
- Relationships with peers - increased interaction and collaboration with peers
- Personal attitudes towards computer technology
- Teachers’ views, beliefs and attitudes towards computer uses in students lives and towards computer integration into schools
- Teachers’ views of learning and the way that a teacher learns – if he/she is life long learner, social learner, constructs knowledge etc
- Teachers involvement with the system - active system participants, decision makers, take over leadership roles and work on committees
- Using computer technology for personal purposes

Professional
- Experience
  - College classes in acquiring basic computer skills and learn how to use computer applications
  - College preparation in computer curriculum integration
  - Computer Literacy level
  - Computer competence/excellence in integrating computer technology into classrooms.
  - Using computer technology for preparation purposes (non-instructional) activities
- Professional Development
• Adequate and continuous professional development in acquiring basic computer skills and learn how to use computer applications (enhancement of computer literacy)
• Adequate and continuous professional development in computer-curriculum integration
• Participate in seminars and workshops regarding computer technology integration
• Teachers’ professional engagement – active in their profession, attend workshops, involvement, willingness and attitudes towards professional development and trainings

• Philosophies - Instructional practices
  • Teaching philosophy - favors constructivist-oriented teaching practices and in general teachers’ attitudes towards modern learning theories
  • Teachers’ role - coach, facilitator, lecturing, tutoring, provide scaffolding, partners with students etc
  • Instructional practices – teachers that focus on knowledge construction, “hands-on” assignments, use of problem based learning, case-based learning, anchored instruction, reflective inquiry, web-based learning etc
  • Classroom environments – teachers that set up student-oriented classroom environments and promote active participation of the learner, develop collaborative, active and authentic learning environments, open learning environments and transforming classroom into learning communities etc
  • Students and Learning – teachers that promote social learning, increased interactivity and collaboration among students, making learning more meaningful to students etc
  • Students and Skills – teachers that emphasize on higher order skills, critical thinking, problem solving, decision making skills etc
Teachers that are early adopters of new ideas, reforms and practices, highly motivated and eager to learn new technologies that will change the way they teach and enhance students’ learning and achievement.

**Organizational – support networks**

- Positive school environment
- Supportive school leadership - principal’s beliefs, attitudes towards computer integration as well as support and involvement
- Adequate technology resources: access to hardware and software, number of computers in the classrooms
- Adequate time for preparation and implementation
- Appropriate assessment and evaluation of the integration – teachers’ coaching
- Continuous technical support and technical assistants
- School culture – social network of computer-using teachers in the same school
- Funding
APPENDIX D

THE QUESTIONNAIRE

COMPUTER TECHNOLOGY INTEGRATION IN CYPRUS ELEMENTARY SCHOOLS

Please answer the following:

1. What grade do you teach? (Circle one)
   1  2  3  4  5  6

2. How many years have you been a teacher? Write in the number of years below.
   1-4 years  5-8 years  9-12 years  13-16  16+ years

3. Please circle your gender.
   Male   Female

4. Please write your age in the space below.
   22-30 years  31-40 years  41-50 years  51-60 years  61+ years

5. How many students do you currently teach? Write in the number below.
   5-10  11-15  16-20  21-25  26-30  30+

6. What degrees do you currently hold? Place a check next to the degrees you currently hold. List the major field and the year in which you received the degree in the spaces to the right.

<table>
<thead>
<tr>
<th>Degree</th>
<th>Major field</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Certificate of Advanced Studies beyond the Bachelor’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctorate</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. Where do you use a computer? Please circle all that apply.
8. Do you have an Internet connection at home? (Circle one)
   Yes    No

9. How often do you use computers for each of the tasks described below? Please mark the appropriate box for each task.

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Seldom</th>
<th>2-3 times a month</th>
<th>Once a week</th>
<th>Several times a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal uses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gathering material for teaching</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparing material for teaching</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicating with teachers or administrators by e-mail</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presenting course material to students</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use computer technology as an educational tool at the teaching process</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keeping student records</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Thinking specifically about student classroom computer usage during a typical month, how often would you say your students use computers to do each of the following?

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Seldom</th>
<th>2-3 times a month</th>
<th>Once a week</th>
<th>Several times a week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learn subject matter</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Play games</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practice word processing skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use educational software</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As a reward for good behavior</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As a reward for good performance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Write papers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prepare class projects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Search the Internet to research to gather educational material</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work collaboratively with other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
students
To solve complex problems
To work in the computer lab
Other (Please specify):…………..
Other (Please specify):…………..

11. How much do you agree or disagree with the following statements? Please mark the appropriate box for each statement below.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am a competent computer user</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is important for my students to know how to use computer technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>It is important that the Cyprus educational system teach students computer skills</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer is an important tool for my students to acquire high-level thinking skill</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As a teacher, it is important for me to use computers as teaching tools</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In elementary schools, computers should not be mainly used as rewards for good behavior</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In elementary school classrooms, computers are best used for acquiring new knowledge and skills and not for practice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I like using the computer as a teaching tool in my classroom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers are good tools for motivating students</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>My teaching colleagues often come to me for advice or to learn my opinions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>When possible, I try to serve on school committees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students should be active participants in the teaching process</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students usually learn more from newer kinds of teaching practices than from traditional kinds of teaching practices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>As a teacher, I find important to be professionally trained continuously in different issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most of the teachers in my school use frequently computers in their classrooms</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
12. Listed below are a number of factors that might influence teachers’ usage of computers in the classroom. How important are these factors to you? Please rank these factors from “1” (most important) to “6” (least important).

<table>
<thead>
<tr>
<th>Factor</th>
<th>Ranking in terms of importance to you</th>
</tr>
</thead>
<tbody>
<tr>
<td>My personal attitude towards computer technology</td>
<td></td>
</tr>
<tr>
<td>My college preparation in using computer skills</td>
<td></td>
</tr>
<tr>
<td>My college preparation in integrating computers into the classroom or curriculum</td>
<td></td>
</tr>
<tr>
<td>My professional development activities in acquiring basic computer skills</td>
<td></td>
</tr>
<tr>
<td>My professional development activities in integrating computers into the curriculum</td>
<td></td>
</tr>
<tr>
<td>My level of computer competency</td>
<td></td>
</tr>
<tr>
<td>The amount of support my principal provides to me in terms of integrating computer technology in my classroom</td>
<td></td>
</tr>
<tr>
<td>The way in which I am assessed or evaluated for using computers in my classroom</td>
<td></td>
</tr>
<tr>
<td>Having access to technology resources (software, hardware, etc.)</td>
<td></td>
</tr>
<tr>
<td>The amount of support and assistance that I receive from the district/local technology coordinator</td>
<td></td>
</tr>
</tbody>
</table>

13. Please use the space below to discuss any other issues and/or additional information about computer technology into classrooms.

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

Thank you very much for taking the time to complete this survey!
APPENDIX E

THE INTERVIEW PROTOCOLS

APPENDIX E1 - INTERVIEW PROTOCOL A

COMPUTER TECHNOLOGY INTEGRATION IN CYPRUS ELEMENTARY SCHOOLS

Interview Protocol A
(Teachers that are high computer users)

[Introduction: “Hello, my name is Nikleia. I’d like to talk to you today about some of your opinions about teaching and some of things you are doing in your class. All your comments will be kept confidential and no one you know will ever know what you said today. As you can see, I’m taping this interview, but I can turn off the recorder if at any time you decide you’d rather not be taped.”]

Opening/Introductory Question

To begin with let’s talk about your teaching. I know that teaching can be very challenging but also very rewarding. I’m going to ask you to think about a day you had as a teacher that was very rewarding, a day that made you feel very good. Can you describe that day for me? For example, what were you doing? What were your students doing? How were you feeling?

Main Part

It seems like some teachers tend to take a fairly traditional approach in the classroom, for example they teach their students the same way they were taught when they were students. But others like to try different kinds of instructional approaches. What about you? Would you say you have a “philosophy” that you follow in terms of your teaching? I mean, would you describe yourself as “traditional”? “a trend setter”? a “progressive”?

One thing I’m especially interested in is the use of computers in the classroom.

The responses you gave on the questionnaire you completed suggest that you are a regular user of computers in the classroom. Can you give me some examples of the ways you use them in your class? [PROBE FOR SUCH FACTORS AS time, students’ role, teachers’ role, students reactions, types of materials, subjects, etc. PROBE FOR SPECIFIC EXAMPLES OF USAGE]
How successful do you feel you have been in integrating computers into your classroom? I mean, have there been “great successes” you can describe? [WAIT FOR RESPONSE] What about problems you’ve encountered? Has anything limited your ability to use computers the way you’d really like to?

How would you describe your own “ideal vision” of how computers should be used in the classroom? [WAIT FOR RESPONSE] How far do you feel you are from making this a reality? What kinds of resources or training do you think you would need to make it a reality?

How do you think you compare with your fellow teachers in terms of the ways you use computers in your classroom? [PROBE FOR SPECIFICS, FOR EXAMPLE, ARE THERE TEACHERS SHE LEARNS FROM? TEACHERS WHO TRY TO LEARN FROM HER?]

Why do you think you tend to use computers more than other teachers?

Closing Questions

Some people think that classroom computer integration is the “wave of the future.” Other people see computers as overrated, maybe like “very expensive chalkboards.” What do you think about the future of classroom computers? For example, what might we be seeing in a classroom like yours ten years from now?

Do you have anything else that you would like to mention? Anything that you believe it is important and it has not been covered or addressed through the interview?

Thank you very much for your cooperation and the time you invested in participating to the interview!!!
**APPENDIX E2 - INTERVIEW PROTOCOL B**

**COMPUTER TECHNOLOGY INTEGRATION IN CYPRUS ELEMENTARY SCHOOLS**

**Interview Protocol B**  
(Teachers that are low computer users)

**Opening/Introductory Question**

To begin with let’s talk about your teaching. I know that teaching can be very challenging but also very rewarding. I’m going to ask you to think about a day you had as a teacher that was very rewarding, a day that made you feel very good. Can you describe that day for me? For example, what were you doing? What were your students doing? How were you feeling?

**Main Part**

It seems like some teachers tend to take a fairly traditional approach in the classroom, maybe they teach their students the same way they were taught when they were young. But others like to try different kinds of instructional approaches. What about you? Would you say you have a “philosophy” that you follow in terms of your teaching? I mean, would you describe yourself as “traditional”? “a trend setter”? a “progressive”?

One thing I’m especially interested in is the use of computers in the classroom.

Many school officials and policy people like to talk about ‘integrating computers into the classroom.’ What does this idea mean to you? [WAIT FOR RESPONSE]. Do think it’s a good idea? Do you believe that computer technology should be integrated as tools in teaching and learning activities and why or why not?

What do you have to say about integrating computer technology integration into your classroom? On a scale of 1 to 10 how would you describe your success in integrating computers in the classroom? [WAIT FOR RESPONSE]

When you do use computer technology in your classrooms practices how do you do that? What activities do you perform when you use computer technology? Can you give me some examples of the ways you use them in your class? [PROBE FOR SUCH FACTORS AS time, students’ role, teachers’ role, students reactions, types of materials, subjects, etc. PROBE FOR SPECIFIC EXAMPLES OF USAGE]

What are the factors that stand in the way of you increasing the amount of computer usage in your class? [PROBE: What do you feel you need in order to be able to integrate computer applications into your classroom practices? Training and resources? If nothing will help you, why do you feel that?]
How do you think you compare with your fellow teachers in terms of the ways you use computers in your classroom? In terms of your ideas and practices regarding computer technology integration? [PROBE: Why do you use computer technology less than other teachers?]

Closing Questions

Some people think that classroom computer integration is the “wave of the future.” Other people see computers as overrated, maybe like “very expensive chalkboards.” What do you think about the future of classroom computers? For example, what might we be seeing in a classroom like yours ten years from now? [PROBE for “ideal vision” of computer technology in schools, and description of how it could be used in the classrooms]

Do you have anything else that you would like to mention? Anything that you believe it is important and it has not been covered or addressed through the interview?

Thank you very much for your cooperation and the time you invested in participating to the interview!!!
### APPENDIX F

#### TEACHERS’ EDUCATION

**Table F.1**

<table>
<thead>
<tr>
<th>Bachelor Major</th>
<th>N (Frequency)</th>
<th>%</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did not report a major</td>
<td>253</td>
<td>86.3</td>
<td>0.73</td>
<td>2.20</td>
</tr>
<tr>
<td>Linguistics</td>
<td>6</td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>5</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Music</td>
<td>2</td>
<td>0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minority Students</td>
<td>2</td>
<td>0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedagogy</td>
<td>7</td>
<td>2.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Issues</td>
<td>4</td>
<td>1.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>5</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>1</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychology</td>
<td>3</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special Education</td>
<td>1</td>
<td>0.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English as a second language</td>
<td>2</td>
<td>0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Greek Language</td>
<td>2</td>
<td>0.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>293</strong></td>
<td><strong>100.00</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table F.2**

<table>
<thead>
<tr>
<th>Certificate Major</th>
<th>N (Frequency)</th>
<th>%</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did not hold a Certificate</td>
<td>282</td>
<td>98.0</td>
<td>0.058</td>
<td>0.44</td>
</tr>
<tr>
<td>Did not report a major</td>
<td>5</td>
<td>1.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical Training</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers in Education</td>
<td>2</td>
<td>0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civics</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion in Education</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology in Education</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>293</strong></td>
<td><strong>100.00</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table F.3
**Teachers’ Master Degree Majors**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master’s Majors</td>
<td></td>
<td></td>
<td>1.31</td>
<td>4.14</td>
</tr>
<tr>
<td>Did not hold a master’s degree</td>
<td>229</td>
<td>78.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not report their major</td>
<td>20</td>
<td>6.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information technology in Education</td>
<td>4</td>
<td>1.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Administration</td>
<td>6</td>
<td>2.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linguistics</td>
<td>4</td>
<td>1.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers in Education</td>
<td>4</td>
<td>1.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Administration</td>
<td>2</td>
<td>0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Curriculum and Instruction</td>
<td>4</td>
<td>1.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Management</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Media in Education</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culture and Language</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Art</td>
<td>2</td>
<td>0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geography</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design and Technology</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA in Education</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Educational Technology</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyslexia</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education and Society</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics in Education</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English Language</td>
<td>2</td>
<td>0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer Science</td>
<td>3</td>
<td>1.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food and Nutrition</td>
<td>2</td>
<td>0.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>293</td>
<td>100.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table F.4
**Teachers’ Doctorate Degree Majors**

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>%</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctorate Major</td>
<td></td>
<td></td>
<td>0.0034</td>
<td>0.058</td>
</tr>
<tr>
<td>Did not hold a Certificate</td>
<td>291</td>
<td>99.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not report a major</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers in Education</td>
<td>1</td>
<td>0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>293</td>
<td>100.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX G

**Table G.1**

*Factors that Influence Teachers’ in Integrating Computers in their Classroom Practices (n=293)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>I am a competent computer user</td>
<td>2.90</td>
<td>.82</td>
</tr>
<tr>
<td>It is important for my students to know how to use computer technology</td>
<td>3.37</td>
<td>.53</td>
</tr>
<tr>
<td>It is important that the Cyprus educational system teach students computer skills</td>
<td>3.59</td>
<td>.49</td>
</tr>
<tr>
<td>Computer is an important tool for my students to acquire high-level thinking skills</td>
<td>3.02</td>
<td>.74</td>
</tr>
<tr>
<td>As a teacher, it is important for me to use computers as teaching tools</td>
<td>3.10</td>
<td>.58</td>
</tr>
<tr>
<td>In elementary schools, computers should not be mainly used as rewards for good behavior</td>
<td>3.10</td>
<td>.61</td>
</tr>
<tr>
<td>In elementary school classrooms, computers are best used for acquiring new knowledge and skills and not for practice</td>
<td>2.93</td>
<td>.53</td>
</tr>
<tr>
<td>I like using the computer as a teaching tool in my classroom</td>
<td>3.02</td>
<td>.67</td>
</tr>
<tr>
<td>Computers are good tools for motivating students</td>
<td>3.24</td>
<td>.51</td>
</tr>
<tr>
<td>My teaching colleagues often come to me for advice or to learn my opinions</td>
<td>2.53</td>
<td>.82</td>
</tr>
<tr>
<td>When possible I am try to serve on school committees</td>
<td>2.88</td>
<td>.66</td>
</tr>
<tr>
<td>Students should be active participants in the teaching process</td>
<td>3.43</td>
<td>.93</td>
</tr>
<tr>
<td>Students usually learn more from newer kinds of teaching practices than traditional kinds of teaching practices</td>
<td>3.19</td>
<td>.60</td>
</tr>
<tr>
<td>As a teacher, I find important to be professionally trained continuously in different issues</td>
<td>3.58</td>
<td>.55</td>
</tr>
<tr>
<td>Most of the teachers in my school use frequently computers in their classrooms</td>
<td>2.71</td>
<td>.71</td>
</tr>
<tr>
<td>Students need to have some choices in the things they learn and the way they learn them</td>
<td>2.64</td>
<td>.59</td>
</tr>
<tr>
<td>I often collaborate with my colleagues in subject related to school</td>
<td>3.23</td>
<td>0.56</td>
</tr>
<tr>
<td>I take over many responsibilities and I am active in my school’s activities</td>
<td>3.11</td>
<td>0.57</td>
</tr>
<tr>
<td>Groups of Factors</td>
<td>Variables</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Group of Factors 1 – Teachers’</strong></td>
<td>- It is important for my students to know how to use computer</td>
<td></td>
</tr>
<tr>
<td><strong>Attitudes towards applying</strong></td>
<td>technology</td>
<td></td>
</tr>
<tr>
<td><strong>computers in the classroom</strong></td>
<td>- It is important that the Cyprus educational system teach students</td>
<td></td>
</tr>
<tr>
<td></td>
<td>computer skills</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Computer is an important tool for my students to acquire high-level</td>
<td></td>
</tr>
<tr>
<td></td>
<td>thinking skills</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- As a teacher, it is important for me to use computers as teaching</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tools</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- I like using the computer as a teaching tool in my classroom</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Computers are good tools for motivating students</td>
<td></td>
</tr>
<tr>
<td><strong>Group of Factors 2 – Teachers’ Professional</strong></td>
<td>- My teaching colleagues often come to me for advice or to learn my</td>
<td></td>
</tr>
<tr>
<td><strong>Behavior</strong></td>
<td>opinions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- When possible I am try to serve on school committees</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- I take over many responsibilities and I am active in my school’s</td>
<td></td>
</tr>
<tr>
<td></td>
<td>activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- I often collaborate with my colleagues in subject related to school</td>
<td></td>
</tr>
<tr>
<td><strong>Group of Factors 3 – School</strong></td>
<td>- Most of the teachers in my school use frequently computers in their</td>
<td></td>
</tr>
<tr>
<td><strong>climate (organizational)</strong></td>
<td>classrooms</td>
<td></td>
</tr>
<tr>
<td><strong>Group of Factors 4 – Teachers’</strong></td>
<td>- Students usually learn more from newer kinds of teaching practices</td>
<td></td>
</tr>
<tr>
<td><strong>Transformational Behavior</strong></td>
<td>than traditional kinds of teaching practices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Students need to have some choices in the things they learn and the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>way they learn them</td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX H

**TEACHER-REPORTED FACTORS THAT PREVENT THEM IN USING COMPUTER TECHNOLOGY IN THEIR CLASSROOM PRACTICES**

**Table H.1**  
*Teacher-Reported Factors that Prevent them in Using Computer Technology in their Classroom Practices*

<table>
<thead>
<tr>
<th>A/A</th>
<th>Factors</th>
<th>Low (4 teachers)</th>
<th>Moderate (8 teachers)</th>
<th>High (10 teachers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td><strong>Lack of Resources</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Only one computer per classroom</td>
<td>4</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Lack of Equipment</td>
<td>3</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Not enough prepared materials from the officials</td>
<td>4</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Materials preparation</td>
<td>1</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Educational software’s language</td>
<td>1</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td><strong>Tyranny of the Curriculum</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume of the curriculum</td>
<td>4</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Direct pressure from the inspectors to cover the curriculum</td>
<td>1</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td><strong>Incomplete and inadequate professional development</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>8</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>Lack of guidance, support, and incentives from the officials</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inadequate support from the district technology coordinators and the technology team</td>
<td>4</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>No technical support</td>
<td>3</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td><strong>Other Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Technical Problems with the computer in the classroom and in the lab</td>
<td>2</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Students Computer Literacy level</td>
<td>4</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Some ministry officials and educators do not realize the use of computer technology as an educational tool in the classroom</td>
<td>1</td>
<td>4</td>
<td>7</td>
</tr>
</tbody>
</table>
## APPENDIX I

**Teacher-Reported Factors that Facilitate Them in Using Computer Technology in their Classroom Practices**

<table>
<thead>
<tr>
<th>A/A</th>
<th>Factors</th>
<th>Low (4 teachers)</th>
<th>Low-High (8 teachers)</th>
<th>High (10 teachers)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Computer literate</td>
<td>2</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Classes in computer integration in college</td>
<td>1</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>Classes in acquiring computer skills in college</td>
<td>1</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>PTAs bought educational software</td>
<td>0</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Knowledge on hardware and software issues</td>
<td>0</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>6</td>
<td>Education/Degrees in majors related to computer technology</td>
<td>0</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Teachers personal beliefs and attitudes towards computer technology</td>
<td>0</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
<td>Teachers that do not have their own class and they teach different subjects</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>9</td>
<td>Teachers’ Instructional philosophies</td>
<td>Not reported by the teachers but examined by the author.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX J

#### SUMMARY OF THE STEPS TOOK PLACE THROUGH THE PRESENT STUDY

<table>
<thead>
<tr>
<th>Steps</th>
<th>Action</th>
</tr>
</thead>
</table>
| 1     | **Reviewing the literature**  
  - Factors that influence teachers in applying computers in their classroom practices  
  - Various types of computer usage  
  - Exemplary and Non-exemplary teacher computer users |
| 2     | **Developing the conceptual framework**  
  See Appendix B |
| 3     | **Finalizing the research questions**  
  - How do teachers and students in Cyprus elementary schools apply computer technology in the classroom?  
  - What are the factors that influence teachers in integrating computer technology into their classroom practices in Cyprus elementary schools? |
| 4     | **Selecting the appropriate methodology to address the study’s research questions, Evaluative Case study through:**  
  - Structured questionnaires  
  - Semi-structured open-ended interviews |
| 5     | **Developing the instruments**  
  - Questionnaires  
  - Interview protocols  
    - Teachers that are high computer users  
    - Teachers that are low computer users |
| 6     | **Piloting the instruments**  
  - 8 Cypriot elementary teachers  
  Revising the instruments based on teachers comments and suggestions in the pilot phase |
| 7     | **Data collection and analysis**  
  - 293 completed questionnaires by Cypriot elementary teachers  
  - Analyzing the date gathered from the questionnaires  
    - Descriptive statistics  
    - Inferential statistics (regression analysis)  
  - Revising interview protocols based on the results of the data analysis of
the questionnaires
- 22 teacher interviews
  - 10 high computer users
  - 8 moderate computer users
  - 4 low computer users
- Analyzing the interviews based on the themes emerged

<table>
<thead>
<tr>
<th></th>
<th>Discussion of the results</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>- Integrate the data analyzed from the questionnaires and the interviews</td>
</tr>
<tr>
<td></td>
<td>- Compare to previous studies</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Implications for policymakers and educators based on the results of the study</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Questions for further study based on the results of the study</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>
VITA

Nikleia Eteokleous born and grew up in Lefkosia, Cyprus. Her Interest in education began while she was still pursuing her bachelor degree in the University of Cyprus. Although her undergraduate major was in Public and Business Administration, she came to be interested in Education while getting a part-time position in a computer learning school as a computer instructor. Because of her excellent performance and natural communication with children, after a year she became a branch manager in the computer learning school and also continued to be a computer instructor.

After finishing her B.A., she made a decision to go to the United States because she believed that the programs of Educational Administration and Leadership in United States could give her more opportunities to study as well as to contact education itself. Additionally, throughout her studies in the United States, she wanted to achieve the interrelation of Business Administration and Education.

Ms. Eteokleous studied Educational Administration for M.Ed as well as Instructional Systems, with emphasis in Educational Technology for M.Ed at Pennsylvania State University, State College. While having a position as a research graduate assistant in the Department of Education Policy Studies at the PSU, she realized that she wanted to emphasize more in the field of Educational Administration / Leadership. She decided to pursue a doctoral degree in that field. While finishing her doctoral degree she got a position as an Assistant to the Head of Research and Development Department in a private college in her country.

Her research focuses on areas of educational leadership and management, computer technology in education, and systemic change in education.