USE AND INTEGRATION OF COMPUTER AND COMPUTER-RELATED TECHNOLOGY BY FACULTY MEMBERS AT THE INSTITUTE OF PUBLIC ADMINISTRATION IN SAUDI ARABIA

By

Abdullah Sulaiman Al-Weshail

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By

Abdullah Sulaiman Al-Weshail

Approved:

John F. Perry, Jr.
Professor and Acting Head of the Department of Technology and Education
(Director of Dissertation)

W. C. Johnson
Associate Professor of Technology and Education
(Committee Member)

Ned B. Lovell
Professor and Head of the Department of Educational Leadership
(Committee Member)

William H. Graves
Dean of the College of Education

Patti S. Abraham
Professor of Business Technology
(Committee Member)

Vincent R. McGrath
Professor of Education
(Committee Member)

Bruce E. Stirewalt
Graduate Coordinator of the Department of Technology and Education

Richard D. Koshel
Dean of the Graduate School

Name: Abdullah Sulaiman Al-Weshail

Date of Degree: August 2, 1997

Institution: Mississippi State University

Major Field: Education--Business Technology

Major Professor: Dr. John F. Perry, Jr.

Title of Study: USE AND INTEGRATION OF COMPUTER AND COMPUTER-RELATED TECHNOLOGY BY FACULTY MEMBERS AT THE INSTITUTE OF PUBLIC ADMINISTRATION IN SAUDI ARABIA

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Candidate for Degree of Doctor of Philosophy

Educators are required to use and integrate computer and computer-related technology into their personal and professional tasks in order to facilitate the teaching/learning process as well as to prepare their students for current and future demands of the technologically advanced business world. Evaluation of the current state of use and integration of computer and computer-related technology by faculty members at the Institute of Public Administration (IPA) in Saudi Arabia should assist in planning for faculty training and development programs.

This study had three purposes. Those were: (a) to evaluate the current state of use and integration of computer and computer-related technology applications, telecommunications, and hardware by the IPA faculty members into their personal and professional tasks at the Institute of Public Administration in Saudi Arabia, (b) to see how the IPA faculty members felt about using and integrating computer and computer-related technology into their personal and professional tasks, and (c) to find out what the IPA faculty members considered to be the major barriers that impeded the use and integration of computer and computer-related technology into their professional tasks.

A survey was completed by 193 faculty members representing 62.05% of the IPA headquarters faculty population. The results indicated that there was a significant difference between faculty members from different fields of specialty in the use and integration of computer and computer-related technology (applications, telecommunications, and hardware) into their personal and professional tasks.

Faculty members in Computer Science used and integrated computer and computer-related technology more than faculty members in most of the fields included in the study. Word processing was the most frequently used application, electronic mail was the most frequently used telecommunication, and CD-ROM was the most frequently used hardware by the IPA faculty members.

The results indicated that the IPA faculty members had positive attitudes toward the use and integration of computer and computer-related technology into their personal and professional tasks. They rated lack of training as the first major barrier that impeded them from using and integrating computer and computer-related technology into their professional tasks. They rated lack of administrative support and lack of time, equally, as the second major barriers. They rated lack of available software and hardware fourth, lack of technical support fifth, and lack of self-confidence last.

It is recommended that institutions should provide their faculty members with necessary training programs in computer and computer-related technology, provide them with more release and free time, more administrative and technical support, and provide them with software and hardware.

DEDICATION

I dedicate this work to my mother, my father, my brothers, my sisters, my nieces and nephews.

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All the praises and thanks to God for making dreams come true. Throughout this degree I have been touched by many unique individuals. Truly, without their support and encouragement this work may not have happened.

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CHAPTER I

INTRODUCTION

Today's instructors are encouraged to use and to integrate technology into their personal and professional tasks in order to complement the subject matter and facilitate the teaching/learning process in all areas. In fact, teachers are required to formulate a collaborative effort to redesign the curriculum around the technology in the teaching process, prerequisite skills, lecture styles, and examinations in order to improve teaching skills (SteaGall & Mason, 1994). Other studies have also revealed that there is a sequential process in terms of utilizing technologies in the classroom. Teachers should be provided with adequate training programs before they use and integrate technology into their work (Schmidt, 1995). Today's schools are using and integrating technology in numerous forms. James (1995) surveyed the state supervisors of business education regarding the technology trends occurring in their states and found that the majority were using instructional technology, distance education, and internet connectivity (p. 146).

Educators are expected to accept the challenge and improve their teaching styles by using and integrating technology into their daily activities in their classrooms by shifting from the traditional role to coaching and facilitating the learning process. Such an approach would also facilitate shifting the learners' roles to become active participants and adjust to the new style (O'Connor, 1995).

Currently, there are several computer applications that can assist teachers in the day-to-day work inside and outside the classroom such as testing, instructing, and keeping students' records (O'Connor, 1995). As technology expands and becomes more advanced, educators should distinguish between teaching technology and using technology as a teaching tool. The role of teachers in teaching technology depends heavily on introducing students to hardware and software. On the other hand, using technology as a teaching tool is intended to facilitate the teaching/learning process for both teachers and students in the classroom (Kizzier, 1995).

According to Rankin (1995) teachers are encouraged to read current literature regarding technology trends in order to be aware of the demands and needs of the business world where students are expected to work after they graduate. Rankin also indicated that changes in curriculum, along with the required hardware and software, should be based on rational decisions with consideration to the availability of facilities and resources. The main emphasis that has been reported by the literature indicates that using and integrating technology into personal and professional tasks has proven its usefulness for both teachers and students inside and outside school. Gilberti (1994) indicated that technology has affected our lifestyles, and students have to be equipped with the necessary technology in order to become technologically literate. However, in order to prepare students and provide them with the adequate knowledge and skills in technology, teachers should possess the necessary skills in using and integrating technology into daily school tasks. It is important to evaluate and document the current state of technology use and integration by faculty in order to plan and implement adequate and effective programs for faculty training and development (Schmidt, 1995; Blanco, 1996). The faculty members at the Institute of Public Administration (IPA) headquarters in Saudi Arabia were chosen for this study.

According to the Institute of Public Administration (IPA) Annual Report on the Achievement for 1995-1996, the IPA was established in response to the Royal Decree No. 93, dated April 10, 1961, in Riyadh, the capital of Saudi Arabia (p. 3). In addition to the IPA headquarters in Riyadh, three more branches were established to fulfill the demands for the IPA services around the country. First, in the eastern province, an IPA branch was established in the city of Dammam in 1973. Second, in the western province, an IPA branch was established in the city of Jeddah in 1974. Third, the women's branch was established in Riyadh in 1983.

The 1995-1996 report indicated that there was a total of 1,058 employees working for the IPA. There were 516 faculty members, 229 administrators, 99 technicians, and 214 workers (p. 18). The IPA major functions are centered around three areas--training, consulting, and research.

The training services include the following programs: Executive Development, Pre-service, In-service, Special, English Language, Design and Development, and Program Evaluation (p. 5). According to the Annual Report of the IPA Achievement, Arabic Edition (1996), the IPA conducted 144 inservice training programs for 11,264 employees representing 132 firms. During 1996, the IPA provided grants to 198 personnel from six countries to attend its programs. In 1996, the IPA conducted 82 preservice programs for 984 students. Also, the IPA conducted 34 special programs for 756 personnel representing 33 firms. The General Department of Executive Development Programs conducted 60 seminars and two conventions for executives.

According to the IPA Objectives and Activities for 1995, the IPA comprises more than 100 training rooms equipped with modern educational aids. The IPA conference center can accommodate 550 people. The report indicated that the conference center "is equipped with facilities for simultaneous translation in four languages and other facilities for live television photography and transmission to various training rooms" (p. 10).

The Annual Report of the IPA Achievement, Arabic Edition (1996), indicated that the General Secretariat of the Higher Committee for Administrative Reform completed 15 studies to various governmental agencies. Also, 48 administrative consultations were completed by the General Department of Consultations. According to the Institute of Public Administration (IPA) Annual Report on the Achievement of the

IPA for 1995-1996, through this department, the IPA provides general consulting in various fields for government agencies, such as organizational restructuring, improving, developing, and/or simplifying existing routine or new work place procedures (p. 6).

The research services are accomplished through the publications of research, books, journals, articles, and translations of various work (p. 7). The IPA publishes a professional quarterly journal, Public Administration Journal.

The IPA owns and runs its own computer center. Through the IPA local area network, the IPA headquarters and its branches are interconnected for training and administrative purposes. The IPA is linked via the Academic Gulf Network for national and international communication purposes. The Gulf Network is connected to BITNET in the United States, NETNORTH in Canada, and JANET in England as a method to expand communication with international institutions.

The IPA has one of the largest and most advanced libraries in the country. It consists of five departments--Group Development Department, Information Organization Department, Information Service Department, Information Technology Department, and Saudi Governmental Documents Department.

According to the IPA Objectives and Activities of 1995, the IPA has a modern training technology center. The center is equipped with a photographic laboratory, integrated television studios, closed television circuits, montage units, a silkscreen printing laboratory, a multi-image slide projection unit, a computer-aided graphics unit, and a specialized audiovisual library (p. 23). The IPA has full printing and publishing services. The IPA holds, hosts, and participates in national and international conferences and seminars. In addition to providing accommodation for faculty members and students, the IPA provides social activities through its sports center and facilities.

Because of the IPA reputation in both national and international levels, it attracted most of the world's leaders to visit the IPA during their trips to Saudi Arabia. Lately, Nelson Mandella was one of those leaders who visited the IPA during his visit to Saudi Arabia.

Statement of the Problem

This study had three purposes. Those were: (a) to evaluate the current state of use and integration of computer and computer-related technology applications, telecommunications, and hardware by the faculty members into their personal and professional tasks at the Institute of Public Administration (IPA) in Saudi Arabia; (b) to see how the IPA faculty members felt about using and integrating computer and computer-related technology into their personal and professional tasks; and (c) to find out what the IPA faculty members considered to be the major barriers that impeded the use and integration of computer and computer-related technology into their professional tasks.

Hypotheses

This study sought answers to the following hypotheses:

1. There is no statistically significant difference between faculty members from different fields of specialty in use and integration of computer and computer-related technology (applications) into their personal and professional tasks at the Institute of Public Administration in Saudi Arabia.

2. There is no statistically significant difference between faculty members from different fields of specialty in use and integration of computer and computer-related technology (telecommunications) into their personal and professional tasks at the Institute of Public Administration in Saudi Arabia.

3. There is no statistically significant difference between faculty members from different fields of specialty in use and integration of computer and computer-related technology (hardware) into their personal and professional tasks at the Institute of Public Administration in Saudi Arabia.

4. There is no statistically significant difference between faculty members from different fields of specialty in their attitudes toward using and integrating computer and computer-related technology into their personal and professional tasks.

5. There is no statistically significant difference between faculty members from different fields of specialty in what they consider to be the major barriers that impede the use and integration of computer and computer-related technology into their professional tasks.

Rationale for the Study

Because the Institute of Public Administration in Saudi Arabia is the leading agency in improving the quality of the workforce in the country in all areas and in all levels, it was chosen for the study. The Institute of Public Administration's main functions include training, consulting, and research. These functions are performed by hundreds of professional professors and instructors in several areas. The researcher realized the importance of conducting this study in this particular institution based on several factors.

First, this study provides an evaluation of the current state of use and integration of computer and computer-related technology by the faculty members into their personal and professional tasks at the IPA. Second, this study provides the IPA with adequate information, based on the participants' responses to the questionnaire, to assist in designing and implementing appropriate and effective programs for faculty members, in all fields, for future use and integration of technology, and to equip them with the necessary skills to perform their personal and professional tasks in a technologically advanced society.

Finally, it is hoped that the IPA faculty members will inspire their trainees, students, and other audiences to use technology in their agencies; however, it is important to indicate that this study seeks to emphasize the use and integration of technology into personal and professional tasks and to use technology as a teaching/learning tool to complement the subject matter in all areas and in all levels of the IPA programs and other IPA functions.

Limitations

1. The study was limited to the IPA faculty members at the headquarters in Riyadh, Saudi Arabia.

2. The study was limited to the faculty members who were available and who chose to complete and return the survey.

3. The study was limited to a particular point in time, particularly with respect to the rapid evolving area of technology and attendant changes in hardware, software, and related categories.

4. The study was limited by the respondents' discrete ratings on the survey, and was assumed to represent continuous random variables with an underlying multivariate normal distribution.

5. The study was limited by the "questionnaire effect" and the possibility of misinterpretation of survey questions by the respondents (Ary, Jacobs, & Razavieh, 1990, p. 421).

6. The study was limited by the possibility of differences in response rates across fields of specialization, which may limit the findings.

Definition of Terms

The following terms are defined as they pertain to this study.

1. Authoring System: Software that allows someone to design an instructional program that would serve a particular purpose.

2. Camcorder: A handheld video recorder that records onto videotape which may be viewed through a video player.

3. Capture Board (or Card): A printed-circuit board for capturing individual video frames and storing them in memory, where they are digitized and can be saved.

4. CD-Rom: Compact Disk--Read Only Memory. A digital medium which is read by a computer and contains vast data storage capabilities.

5. Computer Assisted Instruction (CAI): An instructional program, relatively standard, that allows students to interact with the content at their own pace and provides them with immediate feedback.

6. Computer Projection Panel: A tool that allows the instructor to use an overhead projector to display the image generated on a computer monitor that allows the audience to view the computer output and the changes that occur during the presentation.

7. Database: A software program and organizational tool designed for data storage and manipulation.

8. Desktop Publishing: A software program designed to allow the user to perform page layout functions electronically while placing text and graphic images on a WYSIWYG display.

9. Distance Education: A formal approach to learning where the educator and learners are at a distance from each other where instruction is accomplished in real time, one-or two-way communication, and involves audio and video delivered via computer. telephone and/or data lines.

10. Electronic Presentation: A series of on-screen slides, shown directly from a computer, that has the capabilities of inserting, linking, importing and exporting multimedia objects. It allows the author to generate slides from slide masters or from templates, to sort or rearrange slides, and to assign duration (in minutes or seconds) for displaying each slide on screen or proceed through the slides manually.

11. Electronic Bulletin Board: Newsgroups and announcements available through the use of a computer.

12. Electronic Mail: A computer software program designed for computer-to-computer communication. It allows for interchange of information (messages) between accounts maintained on computers through either local area network (LAN) or through the Internet.

13. FTP: File transfer protocol. An application program which moves and exchanges files between client and host computers.

14. Gopher: A menu-driven, text-based system that allows for exploring Internet resources.

15. Hyperlinks: A method of information storage and retrieval that mirrors the way most people learn--by association rather than by moving sequentially from one item to the next.

16. Hypermedia: A combination of hypertext and multimedia.

17. Hypertext: "Hot" text connected to a navigational link. It allows the user to navigate from one piece of information to some other piece of information by clicking on the hypertext text.

18. Interactive Multimedia: Computer-based generation of two or more media, such as graphics, animation, audio, full-video motion, and text, that allows the user to manipulate and interact with the content.

19. Internet: The Internet is a collection of networks or the world-wide "network of networks" that are connected to each other. It provides file transfer, remote login, electronic mail, news and other services.

20. Laserdiscs: A computer disk that has the capability to store text, video, graphics, and sounds.

21. Local Area Network (LAN): A group of computers linked together via telecommunication lines for sharing hardware and software through the same server.

22. Modem: A piece of equipment that codes and decodes electronic signals and connects a computer to a data transmission line (e.g., telephone lines).

23. Multimedia: A combination of two or more media such as visual and audio to convey an idea or a concept.

24. Musical Instrument Digital Interface (MIDI): A system of hardware interface specifications and software protocols which define how musical instruments talk to computers (and software).

25. Netscape: One particular browser program that allows for perusing the world wide web.

26. Presentation Software: A program that allows for the creation of text and graphics in a form of screens (slides) that facilitates the delivery of a presentation.

27. Scanners: A computer reproduction device, that copies text and graphics into a computer.

28. Spreadsheet: A software program used to organize data into rows and columns.

29. Telecommunications: Exchange of information through the use of telephone or Internet connections regardless of location and distance.

30. Telecommuting: The use of computers and telecommunication equipment to conduct work and to communicate with employers, colleagues, and customers outside the traditional office.

31. Teleconferencing: Exchange of conversations and images from a distance in a meeting format.

32. Telnet: A program that allows one computer (client) to log in to other computer systems (hosts) on the Internet.

33. Word Processing: A computer program designed for writing text.

34. World Wide Web (WWW): A hypertext-based system that is used for finding and accessing Internet resources.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Since mastery of subject matter in all areas is the primary requirement for students, teachers should be enabled to communicate ideas using facilities, resources, and delivery methods effectively. Teachers have been using a variety of tools and equipment such as video, audio, television, overhead projector and others for a long time in order to enhance learning. However, today's technology has potential for a much more powerful impact than in the past. Today's technology can enhance and promote instruction, increase student achievement, and better inform and promote society (Blanco, 1996). Preparing today's students and/or retraining current employees with the necessary skills in order to be technologically literate puts more challenge and pressure on educational institutions to use and integrate computers and computer-related technologies into their academic and training programs.

As a result, colleges, universities and other training institutions need to identify, understand, and evaluate the current state of use and integration of technology by their faculty in order to provide adequate and effective training programs in technology for their faculty (Blanco, 1996; Schmidt, 1995). At Bloomsburg University in Pennsylvania, faculty members were being provided with strong support to realize how beneficial instructional technology would be to them and to their students (Kalmbach, 1994). Through such effort, Kalmbach indicated that "As a team, they designed, developed and produced models involving interactive technologies for education" (p. 31). At the University of Liverpool in England, McDonough, Strivens, and Rada's (1994) research indicated that "many departments are using computer-based teaching (CBT) and some are involved in developing their own courseware" (p. 335).

The rapid change and sophistication in technology has brought about a new challenge for educators in all areas to learn how to use and integrate such technology into their personal and professional tasks. Barksdale (1996) emphasized the fact that teachers should make technology an integral part of their teaching and that colleges should prepare students to integrate technology into their work. Barksdale also indicated that the majority of the education professors surveyed said that technology was a very important aspect of education, yet recent graduates "reported that they were either not prepared--or poorly prepared--to use information technology in their classrooms" (p. 40).

American institutions and universities offer courses or incorporate instructional methods within the curriculum to help instructors be aware of, familiar with, and capable of using the most appropriate and effective medium to facilitate the teaching/learning process. Bin-Baker (1996) in her study found that Saudi Higher Education Administrators who graduated from American universities used computers more than those who graduated from other countries. SteaGall and Mason (1994) emphasized the fact that teachers are required to formulate a collaborative effort to rethink and redesign the curriculum around the technology in the teaching process, prerequisite skills, lecture styles, and examinations in order to improve teaching skills.

In fact, McEwen (1996) found that among the instructors surveyed there was a correlation between methods they used in teaching and methods used by their instructors when they were learning. Also, Rutherford and Grana (1995) indicated that faculty may resist new methods because they like to teach the way they were taught themselves.

Faculty must be provided with adequate and appropriate training and support in using technology in order to enable them to use and integrate such technology into their professional tasks and to prepare their students to work in a technology rich environment

(Schmidt, 1995). In order to encourage and motivate faculty members in using and integrating technology, Blanco (1996) recommended that colleges should provide faculty with computers and should wire offices with telecommunications capabilities for electronic mail and access to the Internet. Colleges should provide incentives and release time to allow faculty to attend seminars, workshops, conferences and demonstrations in technology and technology-related issues, and colleges should establish a system in which the use of technology should be one component in the promotion and tenure process. Hillman (1995) found that "Teacher training program was the mechanism that was envisioned and cited most frequently by the respondents as the most effective means for teachers to become technology-using teachers" (p. 84).

Faculty Training in Technology

In order to plan and implement effective training programs, faculty should realize the need, purpose, and relevancy of technology to provide experiences for themselves and for their students to use and to integrate technology into their programs (McNulty, 1995; Schmidt, 1995). In identifying the purpose for technology use by faculty, Blanco (1996) found that among the respondents 55 percent used technology to assist in streamlining instruction, and 34.8 percent used it to offer an alternative to the traditional mode of instruction (p. 68).

Unfortunately, a large percentage of the faculty surveyed who were still not using or integrating technology into their work indicated that it was due to lack of knowlege in operating a computer despite their awareness of the technology impact on education (Blanco, 1996; Schmidt, 1995). The highest level of experience, knowledge and use of technology was limited to word processing and video cassette recorder use (Blanco, 1996; McEwen, 1996; Spotts, & Bowman, 1995). In Saudi Arabia, Bin-Bakr (1996) found that 66.8 percent of the Saudi Higher Education Administrators used computers for text processing, 60.3 percent for research, and 48 percent for instruction.

In addition, several studies found that the highest ranked barriers that prevented faculty from using computer-related technology included lack of time, lack of training, and lack of access (Barksdale, 1996; Blanco, 1996; McDonugh, Strives, & Rada, 1994; Schmidt, 1995). With the lack of formal faculty training by their institutions, Schmidt (1995) found that the majority of the teachers who participated in the study who used and integrated technology into their work indicated that they were self-taught on the use of computers.

Even though training faculty in how to use and integrate technology into their professional tasks was considered to be a major concern in schools, Schmidt (1995) found that schools spent 55 percent of their resources to purchase hardware, 30 percent to purchase software, and only 15 percent for faculty training and support (p. 10). However, Kenzie (as cited by Blanco, 1996), said:

> With the ever-accelerating changes in technology in the schools, the increased demands being placed on teachers to be computer and technology literate, and the growing emphasis being placed on students' problem-solving skills through the use of technology, teacher training institutions must be prepared to produce practitioners who can successfully handle these challenges (p. 37).

In order to respond to similar demands, Kortecamp and Crongiger (as cited by Schmidt, 1995) indicated that the University of New England created five components comprising a comprehensive technology integration model for faculty development. The components included familiarizing faculty with hardware and software through workshops, partnering with mentors, developing personal projects, becoming mentors, and keeping current with new knowledge and technological innovations (p. 28).

Despite the fact that James (1995) surveyed business education state supervisors regarding the technology trends occurring in their states and found that the majority indicated some use of "instructional technology, distance education, and Internet connectivity" (p. 146), other studies reported that most faculty use of technology was largely limited to word processing and video cassette recorder use (Blanco, 1996; McEwen, 1996; Spotts & Bowman, 1995).

Use and Integration of Technology

The Internet has revolutionized and expanded educational resources. It has allowed educators, students, and researchers to go beyond the school walls to access and share information all over the world (Corder & Ruby, 1996; Matyska, 1995; North, Hubbard, & Johnson, 1996; Stull, Bartkus, & Richards, 1996). North, Hubbard, & Johnson (1996) stated that "teachers are using the Internet to share lesson plans, software, and curriculum ideas; to connect students from different cultures so they can share their views and concerns about the world" (p. 47).

Because of the capability of instructional technology to navigate and to link other applications in the system, users will not be limited to school resources but can link to other locations in the Internet in order to maximize learning resources. James (1995) stated that "the Internet brings people together electronically and gives them easy access to each other and to the information and services they want and need" (p. 147).

Moreover, Matyska (1995) indicated that "Others infuse Internet topics and tools into their pre-existing course materials, augmenting their current activities with telecommunications techniques and skill, while creating exciting and productive learning experiences" (p. 19). In fact, the integration of the Internet into the classroom activities promoted students' critical thinking, problem solving, and research skills as well as prepared them technologically and academically for their career (North, Hubbard, & Johnson, 1996).

In addition to Internet resources such as gopher, ftp, telnet, and electronic mail, Stull, Bartkus, & Richards (1996) indicated that World Wide Web (WWW) browsers such as Netscape, Mosaic, Internet Works, and Internet Explorer allow users to perform searching, linking, and navigating around the web with enhanced graphics and audio capabilities (p. 40). The use of electronic mail (E-mail) has expanded learning and interaction opportunities between students and their teachers beyond the school time and the school walls (Baker, 1994). Through the continuous effective and efficient use of e-mail between students and their teachers, Baker said, "The results increased student-teacher involvement, a greater degree of individualized and personalized instruction, more practical and effective group assignments, and an overall expansion of learning time without an increase in actual classroom hours" (p. 31).

Educators could also use advanced technology to deliver their instruction via distance education in order to reach far more audiences and attract more nontraditional, adult students from different sites. Such technology allows students to actively interact with their "TV" teacher (Bowen and Thomson, 1995; Jordahl, 1995). The basic tools needed for carrying out live distance education instruction may include satellite dishes, computers, modems, and telephones (Jordahl, 1995). James (1995) reported that "Instructional technology, which includes multimedia software, laser disc players, and CD-ROM technology, is making teaching and learning visually exciting" (p. 147). Austin (1994) indicated that "With the proliferation of more powerful, faster, and complex computer systems, instructional courseware can appeal to the learner's verbal, visual, and audio learning modalities or info-media abilities." Perreault (1995) stated, "Although in some cases the technology is limited to certain academic areas, the most impressive successes are those school systems that have embraced multimedia as a teaching/learning tool across the curriculum" (p. 63).

In order to emphasize the effect of technology on gaining the learner's interest and attention, Austin (1994) stated that:

> New computer technologies, such as morphing (the transition of one image into another), three dimensional animations, and virtual environments (the perception of being part of the display environment) are being used to focus the attention of the learner in novel ways. In fact, a combination of these technologies is even more powerful (p. 320).

In support of the same notion, Kizzier (1995) said, "Technology has provided teachers with increasingly powerful tools to enrich the learning environment. Not only are new technologies being developed, but old educational technologies, such as videotape and overhead devices, are being integrated with powerful information technologies" (p. 12).

In Austin's pilot study in 1994 conducted to compare the relative effectiveness of three interactive media formats--full motion video coaching, audio coaching, and text coaching--she found that the average post-test gain scores for the text coaching group had less points (26.3) than the video and audio coaching groups with 31.8 and 38.2 points respectively. This study revealed that there are significant differences in the gained scores among the three groups where the group with a multimedia-sensory source that applied full motion video coaching involved students more and enabled them to be more active in the learning process. Boling (1996) indicated that "Interactive multimedia can help students enjoy learning as well as positively affect their attitudes toward a situation like lecture-based distance education" (p. 56).

Perreault (1995) said. "This ability to move the student from a passive receiver to an active participant is what provides the important difference between a multimedia presentation and presentation using multiple media such as film clips, textbooks, and tape recordings" (p. 86). Furthermore, to emphasize the need for technology inside and outside the classroom, Gueldenzoph and Hyslop (1995) illustrated that "The primary purpose for incorporating technological advancement into the classroom is to prepare the students for the computerized world that awaits them in both their personal and professional lives." (p. 99). Utilization of new technologies in the classroom is not just a remarkable vehicle for students to progress and reach certain potential, but the teachers' expectations are getting higher. Such a fact was indicated by Perreault saying, "The expectations of teachers will increase as students advance to higher grade levels" (p. 66).

Technology and Special Needs

Applying new technology as a teaching tool is not limited to one field or one level, but rather, it is very inclusive. Perreault (1995) indicated that "Multimedia technology is a tool appropriate for all levels of education. It provides the mechanism for integrating a variety of media into the curriculum and for providing an interactive learning environment where students can advance at their own pace" (p. 62). The new technology changed the teachers' roles from a teacher to a facilitator, especially when teaching students with special needs. Eichleay (as cited by Holzberg, 1995) said, "Technology is used as a catalyst to help teachers see their roles differently. Once they have special education students in class, they must address a variety of different learning styles. Technology helps them accomplish this objective" (p. 18).

Besides the numerous advantages alluded to above, another major advantage was stated by Eichleay, the coordinator of a Technology resource center at Emmanuel College (as cited by Holzberg, 1995), when he said that he "Believes that technology gives teachers more freedom to bring together regular and special education students. It provides an opportunity for students to work cooperatively to create a quality product, and (allows) students with special needs to contribute at their level of competence and be supported by peers." In another case, Freeman (as cited by Holzberg) "finds that her students are more receptive to learning when she incorporates technology in her therapy sessions. The computers facilitated a 'whole language' approach to learning" (p. 19). Freeman added that computers "Encourage listening, speaking, reading, writing, and touch, and allow kids who had trouble communicating before to 'speak' their minds on screen" (p. 19).

One of the remarkable situations where students with special needs were introduced to technology as a learning tool took place at Hidden Springs Elementary School in Moreno Valley, California. According to Holzberg (1995), McGrath, who worked for a year as a special education teacher in the Resource Room pull-out program at Hidden Springs Elementary, worked with third-through-fifth-graders who were evaluated as "reading below a grade level." McGrath incorporated several technology tools to facilitate the learning process for her students. McGrath incorporated Compton's Multimedia CD-ROM encyclopedia, Bank Street Writer, QuickTime, Kid Pix, and Print Shop's card-making. At the end of the year, students produced an interesting project called "Wonder of the Woods." This project according to McGrath (as cited by Holzberg) "Gave students something to write about...and the technology improved their writing skills because they used spelling checker to edit their stories."

In addition to creating this project, McGrath (as cited by Holzberg) stated that "some of their reading test scores went up by as much as two years" (p. 20). The students learning skills exceeded the expectations of just improving their reading skills. McGrath (as cited by Holzberg) said "They also became real hardware technologists, able to take apart, hook up, and/or troubleshoot computer equipment. Teachers would call on them whenever there was a hardware problem. They became peer tutors in the classroom, teaching others how to use the equipment" (p. 22).

Another story reported by Holzberg (1995) involved students (aged 5-15) with behavioral problems who were introduced to working on computers, and consequently, Klein (as cited by Holzberg) stated that "Many behavioral disorders disappear, and attention span increases." These changes were attributed to the fact that "computers have absolutely no judgmental value" (p. 22). In recognizing and considering such necessity not just by teachers but also by experts in different fields, Holzberg reported that "Teachers aren't the only professionals who recognize the importance of technology as a tool for children with disabilities" (p. 22).

According to Milone (1996) at the Town School for Boys in San Francisco, California, a group called the "Tech Team" consisting of seventh- and eighth-grade students was created to work with HyperStudio as an authoring tool and to explore a variety of technology resources including web sites. Milone indicated that "Team members help teachers and other students develop their multimedia presentations, solve any technology problems they encounter, and maintain the school's web site" (p. 24). At Roseburg High School, Milone indicated that "Moyer's (the technology coordinator and business instructor) students use their multimedia authoring skills for a variety of other projects, ranging from independent studies to regular classroom assignments" (p. 24).

At the Center for Applied Special Technology (CAST) in Peabody, Massachusetts, about 30 specialists in virtually every area of disability developed assistive technology for both children and adults with special needs. Rose, CAST's co-executive director, (as cited by Holzberg) said, "We tend not to focus on the disabilities themselves....Instead we examine problems in existing curricula and conventional teaching approaches that make it difficult for children with disabilities to fit in" (p. 22).

It is apparent that using and integrating technology by teachers and/or students with or without learning disabilities illustrates the necessity for incorporating such tools to make learning more interesting, appealing, fun, entertaining, and achievable. In addition, these studies revealed that there is a variety of software and hardware available to schools, but schools should decide which software and hardware are most appropriate and suitable for their teachers, students, and courses.

Commercial Instructional Programs vs. Teachers' Developed Programs

During the early age of technology's hardware and software, only experts in programming were capable of designing or creating software for use in the classroom. Armstrong and Loane (1994) indicated that educational programs in the past have usually taken the form of Computer Assisted Instruction (CAI) to help teachers in the classrooms (p. 22). Most of these programs lacked flexibility and contained insufficient information about the subject matter. Hutchings, Hall, and Thorogood (1994) in their study support such notion by indicating that "One of the greatest hurdles faced during (their) project was that of finding subject specialists with sufficient time and inclination to become involved in the authoring of applications" (p. 40).

In addition, McDonough, Strivens, and Rada (1994) found that computer-based teaching (CBT) users tend to develop their own courseware instead of relying on commercially produced materials due to the fact that the commercial software available was not always suitable for their needs (p. 342). McDonough, Strivens and Rada indicated that the quality of computer-based teaching materials can be characterized by several attributes. These attributes include flexibility, tailorability, relevance, validity, motivation, portability, and friendliness (p. 337).

Because the new technology provided teachers and students with software and hardware that enabled them to design their own programs that serve their exact needs, there has been a shift in how commercial software developers reevaluate their existing programs and make them more marketable in schools. Armstrong and Loane (1994) said, "Software developers themselves have also been experiencing a change which will have an impact on the market. In order to create effective educational software, it is not only necessary for developers to possess the required programming skill, but they must also comprehend the subject matter of the application" (p. 22). In support of this idea, Davison and Kochmann (1996) said, "The goal is to emphasize that the content is critical and that technology is a tool" (p. 27). They also emphasized the need for teachers to get the proper training in how to use and integrate technology in existing courses.

Computer-assisted instruction, as used by instructors to complement the subject matter has been found to be more effective than traditional methods. Wong (1994) said, "Our field test results indicate that computer-assisted instruction is suitable for secondary schools and provides an enjoyable alternative to traditional methods" (p. 41). However, audience feedback is necessary for evaluating the program whether it is designed commercially or by an expert in the field. The students' suggestions for improvement in Wong's study were grouped into three general areas. According to Wong, the first called for making the lesson shorter and more entertaining; the second called for better graphics and no music; and the third called for improved technical features such as larger print, color, and animation (p. 41).

As the technology becomes more advanced, commercial computer-assisted instruction programs will not be as attractive. Teachers are provided with authoring systems that help them design and tailor their programs to fit into their exact needs for their subject matter as well as for their students. Wong indicated that "Authoring programs are designed so that the writer needs only to be concerned with content the reader will see" (p. 39). Braun (1993) also indicated that "In a sense, this application (multimedia presentation) of hardware and software allows a presentation to be customized to the interests of a target audience of one" (p. 34).

Authoring systems used in education are now more user friendly and require little knowledge in computers and no knowledge in programming. Wong (1994) suggested that "The ease of authoring is determined by the layout of an authoring screen, and a well-programmed template should be easy to fill in" (p. 40). A study conducted by Hutchings, Hall, and Thorogood (1994) indicated that

> As a major part of the project, a set of authoring tools was created which enable users with no previous knowledge to create applications. The tools are incorporated into an authoring system based on HyperCard-StackMaker--which enables the author to quickly and easily incorporate text, animations, simple graphics and video sequences into an application (p. 40).

Even though Wong's (1994) findings indicated how computer-assisted instruction was more effective than traditional methods, Wong stated that "Today, the number of microcomputers found in schools has increased dramatically, but very few teachers are using self-authored CAI. What is wrong?" (p. 39). The answer to such a question could be attributed to the lack of the administrative support, training, and freedom from doing other tasks in order to devote more time for authoring their own programs (Davison & Kochmann, 1996; Kalmbach, 1994).

Authoring Systems

There are many authoring systems available to teachers and students that enable them to convey their messages or ideas effectively and efficiently. Ekhaml (1994) indicated that "There are many easy-to-use, easy-to-learn, dedicated presentation graphics packages that give dynamic special effects and persuasive power" (p. 29).

However, Perreault said, "The challenge facing educators is determining how to best incorporate multimedia lessons into an existing learning environment" (p. 62).

In the business world, Braun (1993) said, "The integration of the personal computer as a graphics engine with traditional 35mm slide projectors and overhead projectors has changed the way business people communicate and persuade" (p. 33). By using such technology in business, Braun indicated that "Graphics and presentation software packages bring the capabilities of a corporate art department to your desktop (but) the purpose of a visual presentation remains to persuade and communicate" (p. 33).

Besides the technology tools being used in business, Ekhaml (1994) said, "In education, they can be used by teachers, administrators, researchers, and scientists to explain complex concepts, illustrate processes, analyze research data, and teach management techniques" (p. 33). In an experimental study conducted by Hutchings, Hall, and Thorogood (1994) using an authoring system to teach Cell Biology in an undergraduate course, it was found that the majority of students, 80 percent said that they enjoyed using the system, and 88 percent found it relevant to the course.

An extremely important feature is the capability of tools to incorporate hypermedia and hypertext into presentations. Importing objects from other applications adds another important feature to electronic presentations. Ekhaml (1994) indicated that "The capability of inserting objects such as clip art and movie clips created in other application programs is an important feature of high-end presentation graphic packages" (p. 29). Such tools allow users to demonstrate to their audience some of the complex and dangerous tasks that might be impossible to do in real life situations. To support such a notion, Armstrong and Loane (1994) stated that "The graphical presentation of ideas can provide advantages over written formulas and theories. For example, animated presentations allow students to actually see a physical law in action" (p. 20).

Armstrong and Loane also indicated that "Other ideas are too expensive or physically impossible to actually demonstrate in a classroom" (p. 20). In providing such a learning environment, Kizzier (1995) indicated that

> The learners then attempt to perform the same skill, in real time and motion, emulating the expert while being recorded by the video camera. The computer then plays back the learner's performance on one half of the screen and the expert's performance on the other half of the screen so the learner can compare the two performances" (19).

According to Rinne (1994), the University of Michigan-Flint developed a similar piece of technology, The Skills System, to assist instructors in teaching skills. The system is an interactive video technology that allows students to record their performance and edit it as many times as they wish. The system then divides the computer screen into two parts where the pre-recorded expert's performance is played on half of the screen and the trainee's performance is played on the other half for comparison. The students perform each skill with voice and body motions. The system helps students to measure their level of mastery and evaluate their competence.

In emphasizing the benefit of using such tools, Graves (1995) indicated that "Presentation software use holds many benefits for teachers, students, or anyone required to stand in front of a group and share ideas" (p. 60). Graves added that "Presentation charts can help to convey ideas in ways words alone cannot--especially when displayed with computer-projection equipment." Perreault (1995) said that "Multimedia presentations combine all or some of the following elements: text, still images, full-motion video, sound, animation, and computer graphics" (p. 62). Besides the powerful capability of combining a variety of components in the presentation, Perreault emphasized the fact that "During a multimedia presentation, the audience is able to interact with the presentation" (p. 62).

The new technology tools will not replace teachers but will eventually replace most of the traditional tools used in the classrooms. Dykman (1994) stated that "Computers, video, CD-ROM, simulation software, electronic communication, virtual reality, intelligent tutoring, and multimedia are tools gradually replacing filmstrips, overhead projectors, typewriters, and protractors" from classrooms of the past (p. 28). An example of replacing some of the traditional tools was presented by Klemin (1993) by stating that "Electronic presentations are replacing the chalkboard, allowing teachers to prepare vibrant presentations that enhance textual materials with pictures, sound, and graphics" (p. 27).

Technology has provided educators with solutions to most of the problems that they face in the classroom especially those who were tied to the chalkboard and often found themselves writing and talking to the board, wasting class time in the writing process, and worrying about spelling, poor writing, and arithmetic mistakes (Landry & Francisco, 1996). Despite the fact that there are some computer applications that allow student instruction, it will never be an alternative to replace the real interaction with real classroom teachers (SteaGall & Mason, 1994).

Another example of replacing printed material by electronic presentation was given by Klemin by encouraging teachers to "Use these teaching tools for primary or remedial instruction...and let (students) develop electronic term papers and presentations to complement the subject matter" (p. 28). Parents' reactions to using such technology by their children was quite positive and encouraging as Perreault (1995) stated that "Parents report that for the first time their children are actively sharing what they are learning in school" (p. 63).

In emphasizing the effectiveness of using electronic presentations, Ekhaml (1994) said, "One essential feature found in high-end presentation graphics packages is the capability to create layers or (slide builds) in which each point in a topic is revealed on a slide line-by-line" (p. 30). In order to produce an effective and attractive quality computer slide show, Ekhaml provided the following recommendations:

- Always plan your presentation on paper. Analyzing your audience, and specifying objectives and content should be included in the planning process.
- Give an attractive, forceful title for your presentation.
- Summarize your points. Use phrases. Avoid the use of complete sentences. Presentations include oral text on the slides. The same transparency rules apply: no more than five or six lines per frame; no more than six words per line.
- The simplicity rules for charts and graphs also apply. Avoid using too many elements, lines, segments, colors, and textures. Show trends rather than detailed data. Reserve detailed data for audience handouts or articles for publication.
- Don't include more than one graph or chart in each slide. If you need to "explode" a pie chart beside another one, limit it to one in each slide.
- Avoid using all caps for large blocks of type as they are hard to read. Use upper and lower case instead. It is acceptable to set headlines or major headings in all caps.
- Type size should reflect the importance of the various ideas in a slide. Headlines should be larger than body copy.
- Limit typefaces, type size, and weights to one or two and retain phase throughout the presentation.
- Use simple, block typefaces and sans serif typefaces. Sans serif typefaces are those with the same thickness at all points, Helvetica is an ideal font. Fancy or ornate types should be avoided.
- Avoid hyphenation. Hyphenated lines interrupt the continuity of the thought.

- Use bullets and numbers to organize ideas in list format. Bullets are the dots, check marks, or other shapes that delineate topics or introduce items in a list. Use them to give list items equal importance. Use numbers to list items if the order of importance or chronological order is important.
- Do not use dashes or asterisks as bullets.
- Have the phrases in bullet lists written in parallel grammatical construction. For instance, use the same verb tense, same voice for verbs, same cases, and same number (singular or plural).
- Avoid superimposing words over graphics as this impairs readability.
- Use boldface or italic type instead of underlining. Avoid excessive underlining.
- Start each heading in the same place on each slide.
- Make line lengths in a text frame approximately equal to one another.
- Use (but don't overuse) repetitive patterns in subdued shades to give the impression of texture.
- Develop a logo or an institutional identification segment for use in your presentations and include this in your opening frame.
- Use build, reveals, or progressive disclosure slides to give visual variety and to help the audience absorb the information one step at a time. Make the last item in the list brighter or of a different color than the other (p. 30).

Because the computer along with other hardware devices and software are needed to create and play back presentations, users should distinguish between interactive multimedia and regular multimedia. Multimedia does not require the use of computers, but it provides more than one medium controlled by the user. On the other hand, interactive multimedia does require the use of computers in order to interact with the content (Galbreath, 1994).

Hypermedia

In a mapping tool experiment where Hypercard links were compared to traditional note taking, Reader and Hammond (1994) found that "The post-test revealed differences in scores between the two conditions, with subjects in the concept mapping condition obtaining a higher score than the note tool subjects (means of 47.9% for concept mapping and 24.3% for the note condition)" (p. 102).

This study revealed the positive effects on students' achievement when using different electronic links to represent the relationships between two or more concepts at any one time. Furthermore, Reader and Hammond (994) indicated that "One possible explanation for the substantial difference between conditions is that for some reason subjects in the concept mapping condition spent more time reading the material in the hypertext system than did those in the note tool condition and thus retained information more effectively" (p. 102).

In comparing the advantages of using hypercard-linking to printed materials, Psotka, Kerst, Westerman, and Davison (1994) indicated that "The hypertext, using Hypercard, provides many digital facilities that cannot easily be made available in a printed text (such as) animation, flipping digital "pages" back and forth automatically at the press of a button even when they are not adjacent in the book, automatic search, automatic highlighting, sound and many more features" (p. 285). Psotka, Kerst, Westerman, and Davison conducted an experimental study where a group of students were divided into three levels of support. Each student was given a written aircraft list using hypertext.

The first group consisting of 20 students was allowed to use only the standard navigation features of hypertext that allowed side-by-side viewing of similar airplanes. This group was referred to as the "Standard Group." The second group also consisting of

20 students was given several additional visual sensory level supports. This group was referred to as the "Sensory Group." The third group consisting of 10 students was urged to use all the supports sequentially during the learning period. This group was referred to as the "Guided Sensory Group."

The result revealed that the "Guided Sensory Group" differed significantly from both of the other groups. The authors' explanation for superiority of the "Guided Sensory Group" compared to other groups was the result from "Strategies for using the Rapid Browsing, Pictures, and similar supports." Such findings revealed that proper use and proper strategies are important aspects in using technology as a learning tool.

Attitudes Toward the Use of Computer-Related Technology

McDonough, Strivens, and Rada (1994) indicated that in higher education teachers are interested in technology and in developing alternative teaching strategies, but they are slower than expected to incorporate such due to economical, political, and psychological factors. They attributed the economical factors to the cost of equipment and staff time. The political factors were attributed to the low academic status of work in educational technology in comparison to research, and the psychological factors were attributed to the fact that some lecturers feel that computer-related technology has nothing to offer to their courses.

In addition, some instructors lack the experience or knowledge in such technology, and others simply do not have the hardware required. Rutherford and Grana (1995) stated that "Faculty will have to renovate attitudes, refurbish frayed pedagogy, and rewire old circuits to accommodate all these technologically inspired changes" (p. 82). Rutherford and Grana indicated several issues that may prevent instructors from learning and using technologies. These issues included fear of change, fear of time commitment, fear of appearing incompetent, fear of techno lingo-what is, fear of techno failure, fear of not knowing where to start, fear of being married to bad choices, fear of having to move backward to go forward, and fear of rejection or reprisals (p. 83).

Even though Bin-Bakr (1996) found that the Saudi Higher Education Administrators who participated in her study reported a positive attitude toward computers and a high level of interest in developing their skills in computer use, she reported that the use of computer applications was fair to low by the subjects. Hillman (1995) found that among 188 students who participated in her study of the teacher preparation program at Mississippi State University, only 35 percent felt prepared to integrate technology-based instruction in the curriculum for their students. Hillman reported that 75 percent of the respondents did not feel prepared to make computer software purchase recommendations to schools. Also, Hillman found that of the respondents who did feel prepared in using technology-based productivity tools for professional and personal use, 73 percent of their use was for word processing, 38 percent for database, 44 percent for spreadsheet, and 40 percent for print/graphics utilities (p. 71).

Technology-Related Issues

Because of the rapid change, advancement, and sophistication in technology, more demands for high quality and standards for software and hardware have been the focus of both producers and consumers. Roberts (1996) stated that "We are in a day and age when technological changes occur at unprecedented rates" (p. 15). In order to facilitate and keep a systematic and a smooth transition to technology advancement, Sewall (1996) emphasized the need for appropriate assessment and planning for the acquisition and upgrading of software and hardware and of what is really available and what is not. Sewall indicated that:

> It will be virtually impossible to keep up with the expanding knowledge base, and it also will be difficult for technologically-impaired individuals to locate information, to filter through it, and to extract that knowledge which is necessary to remain on the cutting edge of professional practice. Those who cannot or will not access the information highway may find themselves farther and farther behind in personal knowledge and in their ability to teach students" (p. 20).

In an effort to meet the technological needs and to become a premier comprehensive regional institution for the next century, Yin and Krentz (1995) indicated that at the University of Wisconsin the emphasis has been given to faculty and staff training, upgrading and improvement of the old hardware and software, and maintenance and repair.

In addition to training and other technical and financial support needed to promote the use and integration of technology across the curriculum by all instructors, it is equally important to consider selecting the appropriate software and hardware. The selection of the software should be appropriate to the subject matter as well as to the hardware available. With the variety of the available software in instructional technology, Gueldenzoph and Hyslop (1995) stated that "Since software applications are used to develop or implement the learning activities, the software chosen must be consistent with the course goals" (p. 103).

Among the important issues to be considered when selecting or purchasing a specific software, Gueldenzoph and Hyslop (1995) indicated that "Most experts suggest that educators perform a needs analysis...to produce a clear understanding of what the software package(s) should be able to do for the user." They also added that "When evaluating software, hardware requirements should be considered first" (p. 104).

Gueldenzoph (1995) indicated that because of the dramatic and rapid change in technology that affected the way businesses operate, educators as well as students have to be alert and prepared to keep up with changes and demands of their positions and their institutions. Gueldenzoph emphasized the fact that the delivery method of teaching computer applications used by teachers in the classroom should enable students to apply what they learn when exposed to new or upgraded versions in order to help facilitate lifelong learning skills.

In fact, educators in all fields should find a way in which to start using technology in their profession. Savages (1995) indicated that "Even though educators within a school system are probably not involved with technology as much as are business and computer teachers, interactive television is an avenue for all teachers to be involved with technology" (p. 86). Also, Flately and Hunter (1995) indicated that "Electronic mail, bulletin boards, and electronic conferences have become standard ways for gathering, sharing, and distributing information in business" (p. 73). Gueldenzoph suggested that in order for teachers to be updated in their fields and stay experts in their areas, they should become actively involved in professional organizations, subscribe to professional and related journals and publications, learn new applications, ask questions, and share information with colleagues.

Teachers and Technology

Kinnaman (1995) stated that "Teachers and technology each have vitally important, but different, roles to play in education." Kinnaman also indicated that "Together, good teachers and good technology form the basis for substantial, lasting educational improvement" (p. 98). Moreover, Donlin (as cited by Milone, 1996) said, "Multimedia authoring and other aspects of technology are not the be-all and end-all for either students or teachers. They are a natural extension of the curriculum that augments instruction" (p. 22).

Teachers may not realize how easy, interesting, and helpful such technology tools are in facilitating the learning process and communicating with their students unless they are provided with the experience through training. McEwen (1996) recommended constructing training programs for teachers in such a way that they learn technical skills as well as how to effectively present microcomputer software skills. McEwen's study revealed that instructors have tended most frequently to apply the same methods in using computers in their classroom as the way they were taught. Therefore, McEwen recommended that teachers should be provided with proper training that would provide them with the appropriate technical and instructional support. Sewall (1996) stated that "The lack of knowledge and/or access to hardware, software and appropriate informational networks will make instruction less effective" (p. 20).

In fact, some instructors lack the necessary skills in using technology in their classroom due to the poor preparation in college. However, providing them with inservice training programs has proven to be effective. Teachers at Roseburg High School in Oregon were provided with inservice training in how to use multimedia presentation "Who then use what they have learned to develop multimedia lessons or guide their students' efforts" (Milone, 1996, p. 22).

Technology may not be widely used or made available unless there is a change in educators' attitudes and the way they view its impact in what technology would bring to their personal and professional work (Barksdale, 1996; McNulty, 1995). Blanco (1996) stated that current and future use of technology "to influence and enhance instruction in a positive way is critical for prospective teachers, for their future students, and for education in general" (p. 33). In addition, Johnson and Harlow in their report in 1993 (as cited by Blanco, 1996) indicated that faculty use of technology prepares students to live and work in a technological world as well as to allow for experimentation for improving education.

McNulty (1995) indicated that "Training teachers how to teach with technology is to instruct teachers to see the good in what they are already doing and the ways in which technology can enable it to get even better" (p. 36). Teachers should not limit themselves to participating in one seminar or training program, but rather they are encouraged to experiment with different materials and different methods in their classroom. Armstrong and Loane (1994) stated that "Determining what material to present, and how to present it, is an iterative process that requires extensive time, thought, and trial-and-error" (p. 20).

Due to the fact that technologies can be integrated into a single application for multiple purposes, Braun (1993) stated that "Telecommunication technology promises a future of remote access to multimedia information. With VHS video, computer graphics, computer animation, digitized still photos, recorded sound, and music all as potential media to be integrated, the possibilities for communicating are infinite" (p. 34).

In the future, Kalmbach (1994) predicted that it will be very hard to access information in a traditional way due to the massive amount of information available electronically. Such predictions should alert educators to use the available technology for personal and professional use. Besides the teacher's role, the use of technologies helps students formulate their own opinion in terms of selecting the proper software and hardware along with helping them to develop higher-order thinking skills and enhance their abilities to work in teams (Schmidt & Kirby, 1995).

Teachers are expected to accept the challenge and improve their teaching styles by applying technology in their classrooms by shifting from a traditional role to coaching and facilitating the learning process. Such trends would facilitate shifting the learners' role to adjust to the new teaching style (O'Connor, 1995). In addition, O'Connor indicated that "meta-learning" for technical skills is creating an environment in which everyone, the teacher and the students, is enmeshed in the technology. Rutherford and Grana (1995) stated that "instructors who wait for instructional norms to change before they incorporate technology into their teaching and learning will have waited too long" (p. 84).

Currently, there are several computer applications that assist teachers in the day-to-day work inside and outside the classroom such as testing, instructing, and keeping student records (O'Connor, 1995). As technology expands and becomes more advanced, educators should distinguish between teaching technology and using technology as a teaching tool. Barksdale (1996) stated that "The schools and colleges generally agree that technology is best learned when it is integrated across the curriculum rather than placed in a technology ghetto" (p. 42). The role of teachers in teaching technology depends heavily on introducing students to hardware and software. On the other hand, using technology as a teaching tool will facilitate the teaching/learning process for both teachers and students in the classroom (Kizzier, 1995).

According to Rankin (1995) teachers are encouraged to read current literature regarding technology trends in order to be aware of the demands and needs of the business world where students are expected to work after they graduate. Rankin also indicated that changes in curriculum along with the required hardware and software should be based on rational decisions with consideration to the availability of facilities and resources. The main emphasis that has been introduced in this paper indicates that using technology as a teaching/learning tool has proven its usefulness for both teachers and students inside and outside school.

In an attempt to provide sufficient inventory regarding the use and integration of technology by educators, previous studies sought information that included faculty use and integration of computer software applications and hardware, faculty attitudes toward the use of technology in education, and barriers that impeded them from using and integrating technology (Blanco, 1996; McEwen, 1996; Schmidt, 1995). Such an inventory would facilitate the evaluation process in documenting the current state of use and integration of technology by faculty members in order to plan and implement appropriate, effective, and sufficient programs for faculty training and development.

CHAPTER III

METHODS AND PROCEDURES

The methods and procedures used in this study are organized into the following sections: research design, selection of subjects, instrumentation, procedures, and data analysis.

Research Design

This study was descriptive and a questionnaire was used to gather the needed data. The survey research method was appropriate for this study because of the nature of the information sought from the participants. The questionnaire was designed to provide information regarding the use and integration of computer and computer-related technology applications, telecommunications, and hardware by the faculty members into their personal and professional work at the Institute of Public Administration in Saudi Arabia. Also, it was designed to solicit information regarding the IPA faculty members' attitudes toward the use and integration of computer and computer-related technology into their personal and professional tasks.

This study was limited to the IPA headquarters' faculty members in Riyadh, Saudi Arabia. The questionnaire was evaluated by five professionals from three different institutions--Mississippi State University, University of North Dakota, and the Institute of Public Administration in Saudi Arabia. The questionnaire was divided into six sections in order to provide adequate data from which answers to the research hypotheses were derived. The first section included demographic data about the subjects. The independent variables in sections two, three, and four included the use and integration of computer and computer-related technology applications, telecommunications, and hardware respectively. In section five, the independent variables included the participants' attitudes toward the use and integration of computer and computer-related technology into their personal and professional tasks. In the last section, the independent variables were the participants' perceptions of the major barriers that impeded them from using and integrating computer and computer-related technology into their professional tasks.

Selection of Subjects

The study included 193 faculty members from the Institute of Public Administration headquarters in Riyadh, Saudi Arabia. In the IPA Annual Accomplishment Report of 1996, it was reported that the number of faculty members was 516 of which 391 of them were working at the headquarters in Riyadh. However, during this study, 80 faculty members were not available due to the fact that 65 were awarded scholarships for higher education and were away, and 15 were working for other organizations temporarily. Surveys were sent to 311 faculty members, and 193 surveys were completed and returned. The respondents to this study represented 62.05% of the total IPA headquarters faculty population.

The study was conducted at the Institute of Public Administration headquarters. This should not affect the external validity of the study since the three other branches share the same functions, activities, missions, and characteristics with respect to their locations and sizes. Because of the important role that the Institute of Public Administration plays in providing training, consultations, and research to the whole country's public and private sectors, it was chosen for the study.

Instrumentation

A questionnaire was constructed to collect data from the subjects in this study. The questionnaire was constructed specifically to serve three major purposes. First, it was constructed to provide an evaluation of the current state of the IPA faculty in use and integration of computer and computer-related technology that includes applications, telecommunications, and hardware into their personal and professional tasks. Second, it was constructed to see how the IPA faculty felt about using and integrating computer and computer-related technology into their personal and professional tasks. Third, it was constructed to see what the IPA faculty consider to be the major barriers that impeded them from using and integrating computer and computer-related technology into their professional tasks.

The use of the phrase 'use and integration' throughout this study reflects those terms being viewed as a unit referring to the respondents use of computer and computer-related technology in any productive capacity. Furthermore, the terms in that phrase encompass the faculty member using and integrating computer and computer-related technology to prepare lessons, assignments, lectures, etc., and that he or she integrates the use of computers into the actual instruction.

The use of the phrase 'personal and professional' throughout this study reflects those terms being viewed as a unit wherein the conjunction 'and' should not be replaced with 'or.' The conjunction 'and' was selected purposefully so as to gather data about subjects personal as well as their professional use of computer and computer related technology.

The major ideas for the applications, telecommunications, and hardware sections were generated from previous studies conducted by Anderson and Griffin, 1994; Blanco, 1996; McEwen, 1996; and Schmidt, 1995. In the attitudes and barriers sections, the major ideas were generated from previous studies conducted by Schmidt, 1995 and

Blanco, 1996. Modification, design, and organization of the questionnaire were constructed specifically to assist in generating information needed from the targeted population at the Institute of Public Administration in Saudi Arabia.

The questionnaire was divided into six sections. The first section was designed to gather demographic data. The second section was designed to discover the respondent's use and integration of computer and computer-related technology applications. The third section was designed to discover the respondents' use and integration of computer and computer-related technology telecommunications. The fourth section was designed to discover the respondent's use and integration of computer and computer-related technology hardware. The fifth section was designed to discover the respondents' attitudes regarding the use and integration of computer and computer-related technology into their personal and professional tasks. The last section was designed to discover the respondent's perceptions of the major barriers that impede the use and integration of computer and computer-related technology into their professional tasks.

In order to maximize the questionnaire validity, it was revised and evaluated by professionals from three different institutions--Mississippi State University, University of North Dakota, and the Institute of Public Administration in Saudi Arabia. These professionals included faculty members at the Department of Technology and Education at Mississippi State University, professor and department chair of the Department of Business and Vocational Education at University of North Dakota, Deputy Director General for Research and Information at the Institute of Public Administration in Saudi Arabia, and the General Director of the Program Design at the Institute of Public Administration in Saudi Arabia.

The survey was pilot-tested and retested with 25 advanced graduate students at Mississippi State University for reliability and for generating comments and recommendations as well as to estimate the time required for its completion. Pearson correlation coefficient (r) was used to test for reliability. The average of each section for reliability test retest was significant (Table 3.1). The average of all sections of the survey was significant, $p < .001$.

Table 3.1
Reliability Test-Retest Using Pearson Correlation Coefficient (r)

Sections	Correlation Coefficient (r)	Significance (p)
Demographic Data	r = .91	p = .000
Applications	r = .80	p = .000
Telecommunications	r = .72	p = .000
Hardware	r = .84	p = .000
Attitudes	r = .57	p = 000
Barriers	r = .75	p = .000
Total Survey	r = .88	p = .000

Procedures

The researcher traveled to Saudi Arabia to gather the information from the subjects at the IPA headquarters in Riyadh in April 1997. The Departments of Computer, Planning, Communications, Library, and Development at the Institute of Public Administration assisted in providing the researcher with an office at the IPA library, the needed stationery, name lists and labels, and distribution and collection of the surveys. Subjects were assured of the confidentiality and protection of their identity and that all answers were analyzed in groups. Once the data was collected, it was brought back to the United States for analysis and interpretation.

Data Analysis

After the survey was completed and brought back to the United States, it was coded and then analyzed using the Statistical Package for the Social Sciences (SPSS). Repeated measure analysis of variance (ANOVA) was used to test for the first three research hypotheses which include the tests for interaction effect. For the fourth and fifth hypotheses, multivariate analysis of variance (MANOVA) was used to test for any significant differences between subjects in different fields of specialty (Borg, & Gall, 1989, p. 557).

Descriptive statistics were used to describe the demographic data. Frequencies of use and integration of computer and computer-related technology was applied to the applications, telecommunications, and hardware sections. A reliability analysis was conducted for the attitudes scale. The internal consistency of reliability coefficient (alpha) was 0.83. All tests had sufficient power.

In section five, a Likert-type scale was used to reflect the participants' attitudes toward the use and integration of computer-related technology into their personal and professional tasks. A Likert scale was recommended by Ary, Jacobs, and Razavieh (1990) as the most widely and successfully used technique to measure attitudes (p. 234).

In section six, a graphic scale type was used as a rating scale (1-10) in which the respondent placed a check at the appropriate point on a horizontal line that runs from one extreme of the behavior in question to the other (p. 243). The level of significance was at 0.05 level.

CHAPTER IV

RESULTS AND DISCUSSION

The outcome of this study is presented in three sections--descriptive data, results, and discussion.

Descriptive Data

Surveys were distributed to 311 faculty members at the Institute of Public Administration (IPA) headquarters in Saudi Arabia. The final response rate was 62.05% as a total of 193 faculty members out of 311 responded to the survey. The respondents represent 15 fields of specialty (Table 4.1).

Of the 193 respondents, 35 hold the Ph.D. degree, 3 hold the Ed.D. degree, 104 hold the masters degree, 12 hold the bachelors degree, and 39 hold the diplomas degree (Table 4.2). Of the 193 respondents, 51 received their last degree in Saudi Arabia, 131 received their last degree in the United States of America, 2 received their last degree in the United Kingdom, 2 received their last degree in France, 4 received their last degree in Egypt, 1 received his last degree in Tunisia, 1 received his last degree in Syria, and 1 received his last degree in Germany (Table 4.3).

Of the respondents, 81 had less than five years of teaching experience, 48 had 6 to 10 years of teaching experience, 24 had 11 to 15 years of teaching experience, 24 had 16 to 20 years of teaching experience, and 14 had over 20 years of teaching experience (Table 4.4). Of the respondents, there were 138 who had conducted consultations in their fields and 55 who did not conduct consultations (Table 4.5). There were 128 who conducted research in their fields and 62 who did not conduct research in their fields (Table 4.6).

Table 4.1
Fields of Specialty and Percentage of Responses

Fields	Faculty Members in the Field	Number of Responses in the Field	Percent of Responses in the Field
Business Education	52	41	78.84%
Public Administration	55	44	80.00%
Computer Science	43	22	51.16%
English and Linguistics	36	20	55.55%
Accounting	20	10	50.00%
Library and Information Science	10	8	80.00%
Sociology	14	7	50.00%
Engineering	13	9	69.23%
Health Service (Administration & Research)	8	6	75.00%
Business Administration	10	5	50.00%
Statistics	8	6	75.00%
Economics	9	4	44.44%
Law	14	4	28.57%
Education	8	3	37.50%
Journalism and Mass Communications	11	4	36.36%
TOTAL	311	193	62.05%

Table 4.2
Qualifications

Fields	Ph.D.	Ed.D.	Masters	Bachelor	Diploma	Total
Business Education	1	--	2	--	38	41
Public Administration	10	1	32	1	--	44
Computer Science	2	--	13	6	1	22
English and Linguistics	5	--	15	--	--	20
Accounting	1	--	7	2	--	10
Library and Information Science	1	--	6	1	--	8
Sociology	2	--	5	--	--	7
Engineering	4	--	5	--	--	9
Health Service (Administration & Research)	4	--	1	1	--	6
Business Administration	2	--	2	1	--	5
Statistics	--	--	6	--	--	6
Economics	2	--	2	--	--	4
Law	1	--	3	--	--	4
Education	--	2	1	--	--	3
Journalism and Mass Communications	--	--	4	--	--	4
TOTAL	35	3	104	12	39	193

Table 4.3
Country of Last Degree

Fields	Saudi Arabia	USA	UK	France	Egypt	Tunisia	Syria	Germany
Business Education	39	2	–	–	–	–	–	–
Public Administration	2	42	–	–	–	–	–	–
Computer Science	6	13	1	1	–	–	1	–
English and Linguistics	–	19	–	–	1	–	–	–
Accounting	1	8	–	–	1	–	–	–
Library and Information Science	–	7	–	–	–	1	–	–
Sociology	–	7	–	–	–	–	–	–
Engineering	–	9	–	–	–	–	–	–
Health Service (Administration & Research)	2	3	–	–	–	–	–	1
Business Administration	1	4	–	–	–	–	–	–
Statistics	–	4	1	–	1	–	–	–
Economics	–	4	–	–	–	–	–	–
Law	–	3	–	1	–	–	–	–
Education	–	3	–	–	–	–	–	–
Journalism and Mass Communications	–	3	–	–	1	–	–	–
TOTAL	51	131	2	2	4	1	1	1
%	26.5%	68%	1%	1%	2%	0.5%	0.5%	.5%

Table 4.4
Number of Years in Teaching Experience

Field	5 or less	6 - 10	11 - 15	16 - 20	20 or more
Business Education	29	7	2	2	–
Public Administration	11	12	13	6	2
Computer Science	12	4	2	2	2
English and Linguistics	6	6	2	4	2
Accounting	2	3	–	2	3
Library and Information Science	–	2	3	3	–
Sociology	3	3	–	1	–
Engineering	5	4	–	–	–
Health Service (Administration & Research)	1	3	–	–	2
Business Administration	2	–	–	1	2
Statistics	3	1	–	2	–
Economics	2	–	1	–	1
Law	4	–	–	–	–
Education	–	1	–	1	1
Journalism and Mass Communications	1	2	1	–	–
TOTAL	81	48	24	24	14
%	42.4%	5.1%	12.6%	12.6%	7.3%

Table 4.5
Consultation Activities

Field	Yes	Percent	No	Percent
Business Education	28	68.3%	13	31.7%
Public Administration	37	84.1%	7	15.9%
Computer Science	14	63.6%	8	36.4%
English and Linguistics	10	50.0%	10	50.0%
Accounting	7	70.0%	3	30.0%
Library and Information Science	6	75.0%	2	25.0%
Sociology	4	57.1%	3	42.9%
Engineering	7	77.8%	2	22.2%
Health Service (Administration & Research)	5	83.3%	1	16.7%
Business Administration	4	80.0%	1	20.0%
Statistics	5	83.3%	1	16.7%
Economics	3	75.0%	1	25.0%
Law	3	75.0%	1	25.0%
Education	2	66.7%	1	33.3%
Journalism and Mass Communications	3	75.0%	1	25.0%
TOTAL	138	71.5%	55	28.5%

Table 4.6
Research Activities

Field	Yes	Percent	No	Percent
Business Education	16	39.0%	24	58.0%
Public Administration	31	70.5%	12	27.3%
Computer Science	11	50.0%	11	50.0%
English and Linguistics	18	90.0%	2	10.0%
Accounting	5	50.0%	5	50.0%
Library and Information Science	8	100%	--	--
Sociology	7	100%	--	--
Engineering	6	66.7%	3	33.3%
Health Service (Administration & Research)	5	83.3%	1	16.7%
Business Administration	5	100%	--	--
Statistics	3	50.0%	2	33.3%
Economics	4	100%	--	--
Law	4	100%	--	--
Education	2	66.7%	1	33.3%
Journalism and Mass Communications	3	75.0%	1	25.0%
TOTAL	128	66.3%	62	32.1%

There were 149 respondents who owned computers and 44 who did not own computers (Table 4.7).

Table 4.7
Computer Ownership

Field	Yes	Percent	No	Percent
Business Education	32	78.0%	9	22.0%
Public Administration	29	65.9%	15	34.1%
Computer Science	22	100%	0	00.0%
English and Linguistics	19	95.0%	1	5.0.0%
Accounting	9	90.0%	1	10.0%
Library and Information Science	5	62.5%	3	37.5%
Sociology	3	42.9%	4	57.1%
Engineering	7	77.8%	2	22.2%
Health Service (Administration & Research)	5	83.3%	1	16.7%
Business Administration	2	40.0%	3	60.0%
Statistics	4	66.7%	2	33.3%
Economics	3	75.0%	1	25.0%
Law	3	75.0%	1	25.0%
Education	2	66.7%	1	33.3%
Journalism and Mass Communications	4	100%	0	00.0%
TOTAL	149	77.2%	44	22.8%

There were 140 respondents who had computers in their offices, and 52 who did not have computers in their offices (Table 4.8).

Table 4.8
Computer in Office

Field	Yes	Percent	No	Percent
Business Education	33	80.5%	7	17.1%
Public Administration	28	63.6%	16	36.4%
Computer Science	22	100%	00	00.0%
English and Linguistics	15	75.0%	5	25.0%
Accounting	5	50.0%	5	50.0%
Library and Information Science	8	100%	0	00.0%
Sociology	4	57.1%	3	42.9%
Engineering	3	33.3%	6	66.7%
Health Service (Administration & Research)	1	16.7%	5	83.3%
Business Administration	5	100%	0	00.0%
Statistics	6	100%	0	00.0%
Economics	2	50.0%	2	50.0%
Law	3	75.0%	1	25.5%
Education	2	66.7%	1	33.3%
Journalism and Mass Communications	3	75.0%	1	25.0%
TOTAL	140	72.5%	52	26.9%

There were 151 respondents who had access to computers at work, while 37 did not have access to computers at work (Table 4.9).

Table 4.9
Access to Computer at Work

Field	Yes	Percent	No	Percent
Business Education	21	51.2%	18	43.9%
Public Administration	32	72.7%	11	25.0%
Computer Science	20	90.9%	2	9.1%
English and Linguistics	18	90.0%	2	10.0%
Accounting	8	80.0%	2	20.0%
Library and Information Science	7	87.5	--	--
Sociology	7	100%	0	00.0%
Engineering	9	100%	0	00.0%
Health Service (Administration & Research)	5	83.3%	1	16.7%
Business Administration	5	100%	0	00.0%
Statistics	5	83.3%	--	--
Economics	4	100%	0	00.0%
Law	4	100%	0	00.0%
Education	2	66.7%	1	33.3%
Journalism and Mass Communications	4	100%	0	00.0%
TOTAL	151	78.2%	37	19.2%

Of the respondents, there were 30 who preferred Macintosh computers, 144 who preferred IBM/IBM compatible, and18 who had no real preference (Table 4.10).

Table 4.10
Kind of Computer Preferred

Field	Macintosh		IBM/IBM Compatible		No Real Preference	
	No	%	No	%	No	%
Business Education	11	26.8%	27	56.9%	3	7.3%
Public Administration	9	20.5%	25	56.8%	1	4.0%
Computer Science	0	00.0%	21	95.5%	1	4.5%
English and Linguistics	4	20.0%	13	65.0%	3	15.0%
Accounting	0	00.0%	9	90.0%	1	10.0%
Library and Information Science	0	00.0%	8	100%	0	00.0%
Sociology	1	14.3%	5	1.4%	1	14.3%
Engineering	0	00.0%	9	100%	0	00.0%
Health Service (Administration & Research)	3	50.0%	3	50.0%	0	00.0%
Business Administration	0	00.0%	5	100%	0	00.0%
Statistics	0	00.0%	6	100%	0	00.0%
Economics	1	25.0%	3	75.0%	0	00.0%
Law	0	00.0%	4	100%	0	00.0%
Education	0	00.0%	3	100%	0	00.0%
Journalism and Mass Communications	1	25.0%	3	75.0%	0	00.0%
TOTAL	30	15.6%	144	75.0%	18	9.4%

Table 4.11
Ways Learned to Use Computer

Categories of Faculty Responses	Number of Responses	Percent
Attended an academic course	36	18.7%
Attended a training program	29	15.0%
Assisted by a colleague or a friend	21	10.9%
Self-taught	40	20.7%
Attended an academic course & attended a training program	6	3.1%
Attended an academic course & assisted by a colleague or a friend	1	0.5%
Attended an academic course & self-taught	9	4.7%
Attended a training program & assisted by a colleague or a friend	5	2.6%
Attended a training program & self-taught	11	5.7%
Assisted by a colleague or a friend & self-taught	14	7.3%
Attended an academic course, attended a training program & assisted by a colleague or a friend	1	0.5%
Attended an academic course, attended a training program, assisted by a colleague or a friend & self-taught	10	5.2%
Attended a training program, assisted by a colleague or a friend & self-taught	2	1.0%
Attended an academic course, assisted by a colleague or a friend & self-taught	2	1.0%
Attended an academic course, attended a training program, & self-taught	3	1.6%
Don't know how to use a computer	1	0.5%
TOTAL	193	100%

Among the respondents, 36 learned how to use a computer by attending an academic course, 29 by attending a training program, 21 by receiving assistance from a colleague or a friend, and 40 were self-taught (Table 4.11).

Results

The results addressed the five hypotheses. The first hypothesis dealt with the use and integration of computer and computer-related technology (applications) into faculty members personal and professional tasks at the Institute of Public Administration in Saudi Arabia. The second hypothesis dealt with the use and integration of computer and computer-related technology (telecommunications) into faculty members' personal and professional tasks at the Institute of Public Administration in Saudi Arabia. The third hypothesis dealt with the use and integration of computer and computer-related technology (hardware) into faculty members' personal and professional tasks at the Institute of Public Administration in Saudi Arabia. The fourth hypothesis dealt with the IPA faculty members' attitudes toward using and integrating computer and computer-related technology into their personal and professional tasks. The fifth hypothesis dealt with what the IPA faculty members consider to be the major barriers that impede the use and integration of computer and computer-related technology into their professional tasks.

In addition, the results included descriptive analysis using frequencies of the respondents' use and integration of computer and computer-related technology applications, telecommunications, and hardware. Also, the results addressed descriptive analysis using frequencies of the IPA faculty attitudes toward the use and integration of computer and computer-related technology into their personal and professional tasks. Finally, the results addressed the respondents' ranking of the six barriers that they think most impeded their use and integration of computer and computer-related technology into their professional tasks.

Hypothesis 1

There is no statistically significant difference between faculty members from different fields of specialty in use and integration of computer and computer-related technology (applications) into their personal and professional tasks at the Institute of Public Administration in Saudi Arabia.

A repeated measure analysis of variance (ANOVA) was conducted on the faculty responses to the applications in order to test the first hypothesis. The ANOVA yielded the following results :

1. The main effect for fields was significant, $F(14,178) = 2.74$, $MSE = 6.79$, $p < .05$.

2. The main effect for applications was significant, $F(14,2492) = 72.66$, $MSE = .43$, $p < .05$.

3. The interaction effect (fields by applications) was significant, $F(196,2492) = 2.93$, $MSE = .43$, $p < .001$.

Given the above main effect for fields, main effect for applications, and interaction effect for fields by applications observed, Tukey-HSD mean comparisons were then employed to locate the significant differences between fields. The results indicated that faculty members in Computer Science and Engineering used and integrated computer and computer-related technology (applications) more than faculty members in Sociology. Also, faculty members in Computer Science reported that they used and integrated computer and computer-related technology (applications) more than faculty members in Business Education.

Tukey-HSD mean comparisons were also employed to locate the significant differences for the interaction effect of fields by applications. Faculty members in

Business Education, Computer Science, and English and Linguistics used and integrated word processing more than faculty members in Sociology.

Faculty members in Accounting and Engineering used and integrated spreadsheets more than faculty members in Law, Sociology, Library and Information Science, Public Administration, and English and Linguistics. Faculty members in Computer Science used and integrated spreadsheets more than faculty members in Law, Sociology, Public Administration, and English and Linguistics. Faculty members in Statistics used and integrated spreadsheets more than faculty members in Law and Sociology.

Faculty members in Engineering used and integrated presentation software more than faculty members in Law, English, Library and Information Science, and Public Administration. Also, faculty members in Computer Science used and integrated presentation software more than faculty members in Law, English, and Public Administration. Faculty members in Engineering used and integrated simulation programs more than faculty members in Library and Information Science, Accounting, Business Education, and Public Administration.

Faculty members in Statistics used and integrated statistics programs more than faculty members in Law, English, Sociology, Accounting, and Computer Science. Faculty members in Economics used and integrated statistics programs more than faculty members in Law and English and Linguistics. Faculty members in Statistics, Computer Science, Public Administration, Engineering, Economics, and Health Service used and integrated statistics programs more than faculty members in Business Education.

Faculty members in Engineering used and integrated graphics programs more than faculty members in Business Education, Sociology, Accounting, Library and Information Science, English and Linguistics, and Public Administration. Faculty members in Computer Science used and integrated graphics programs more than faculty members in Business Education. Faculty members in Engineering used and integrated computer aided design (CAD) programs more than faculty members in Business Education, Public Administration, Computer Science, English and Linguistics, Accounting, Library and Information Science, Sociology, Health Service, Business Administration, Statistics, Economics, Law, and Journalism and Mass Communications.

Further descriptive analysis using frequencies was conducted on the use and integration of computer and computer-related technology (applications) by all respondents (Table 4.13). The results indicated that word processing, database, and spreadsheets were the most frequently used applications among all faculty members in all fields with 56.5%, 20.4%, and 14.0% respectively. Also, the analysis revealed that hypermedia, career information systems, and decision support systems were not used by most faculty members with 82.9%, 81.3%, and 77.2% respectively.

Table 4.12
Respondents by Field Summary Table (Applications Section)

Fields	*M*	*SD*	n
Business Education	24.07	4.77	41
Public Administration	24.87	7.45	44
Computer Science	30.23	5.52	22
English and Linguistics	23.95	5.72	20
Accounting	24.10	5.72	10
Library and Information Science	23.00	4.93	8
Sociology	20.29	4.61	7
Engineering	31.67	8.06	9
Health Service (Administration & Research)	24.50	5.39	6
Business Administration	27.60	9.50	5
Statistics	26.83	5.12	6
Economics	28.25	7.27	4
Law	20.25	3.20	4
Education	26.67	5.51	3
Journalism and Mass Communications	24.50	4.20	4

Table 4.13
Frequency of Use and Integration of Applications

Applications	No Use		Limited Use		Moderate Use		Frequent Use	
	No.	%	No.	%	No.	%	No.	%
Word Processing Applications	11	5.7	21	10.9	52	26.9	109	56.5
Database Applications	64	33.2	68	35.2	41	21.2	20	20.4
Spreadsheets Applications	51	26.4	59	30.6	56	29.0	27	14.0
Desktop Publishing	134	69.4	30	15.5	23	11.9	4	2.1
Teacher Utility Programs	128	66.3	40	20.7	19	9.8	6	3.1
Presentation Programs	97	50.3	63	32.6	21	10.9	11	5.7
Hypermedia Programs	160	82.9	26	13.5	6	3.1	1	0.5
Tutorial Programs	107	55.4	50	25.9	26	13.5	8	4.1
Drill Programs	141	73.1	39	20.2	9	4.7	3	1.6
Simulation Programs	139	72.0	36	18.7	13	6.7	3	1.6
Statistical Programs	97	50.3	53	27.5	25	13.0	18	9.3
Graphics Programs	97	50.3	52	26.9	35	18.1	9	4.7
Computer Aided Design (CAD)	147	67.2	32	16.6	10	5.2	3	1.6
Career Information Systems	157	81.3	25	13.0	11	5.7	0	0.0
Decision Support System	149	77.2	30	15.5	8	4.1	4	2.1

Hypothesis 2

There is no statistically significant difference between faculty members from different fields of specialty in use and integration of computer and computer-related technology (telecommunications) into their personal and professional tasks at the Institute of Public Administration in Saudi Arabia.

A repeated measure analysis of variance (ANOVA) was conducted on the faculty responses to the telecommunications in order to test the second hypothesis. The ANOVA yielded the following results :

1. The main effect for fields was significant, $F(14,178) = 3.88$, $MSE = 1.90$, $p < .05$.

2. The main effect for telecommunications was significant, $F(8,1424) = 46.91$, $MSE = .38$, $p < .05$.

3. The interaction effect (fields by telecommunications) was significant, $F(112,1424) = 3.53$, $MSE = .38$, $p < .001$.

Given the above main effects for fields, main effect for telecommunications, and interaction effect for fields by telecommunications observed, Tukey-HSD mean comparisons were then employed to locate the significant differences between fields. Faculty members in Computer Science used and integrated computer and computer-related technology (telecommunications) more than faculty members in Sociology, Accounting, Business Education, English and Linguistics, and Public Administration.

Tukey-HSD mean comparisons were also employed to locate the significant differences of the interaction effect of fields by telecommunications. Faculty members in Computer Science used and integrated electronic mail more than faculty members in Health Service, Education, Sociology, Business Education, Law, Accounting, and Public

Administration. Faculty members in English and Linguistics used and integrated electronic mail more than faculty members in Business Education.

Faculty members in Computer Science used and integrated electronic bulletin boards more than faculty members in Sociology, Accounting, Journalism and Mass Communications, Business Education, English and Linguistics, and Public Administration.

Faculty members in Computer Science used and integrated local area networks more than faculty members in Health Service, English and Linguistics, Sociology, Law, Journalism and Mass Communications, Public Administration, Accounting, and Engineering. Faculty members in Statistics used and integrated local area networks more than faculty members in Health Service and English and Linguistics. Faculty members in Library and Information Science used and integrated local area networks more than faculty members in English and Linguistics.

Faculty members in Computer Science used and integrated the Internet more than faculty members in Business Education. Faculty members in Computer Science used and integrated the World Wide Web (WWW) more than faculty members in Business Education.

Further descriptive analysis using frequencies was conducted on the use and integration of computer and computer-related technology (telecommunications) by all respondents (Table 4. 15). The results indicated that the most frequently used telecommunications were electronic mail and local area networks with 24.9% and 21.2% respectively. The results also revealed that a high percentage of the respondents, ranging from 76.7% to 85.5%, reported no use of the following telecommunications: teleconferencing, the World Wide Web, the Internet, telecommuting, distance education, electronic bulletin boards, and voice mail.

Table 4.14
Respondents by Field Summary Table (Telecommunications Section)

Fields	*M*	*SD*	n
Business Education	12.05	4.57	41
Public Administration	12.68	3.58	44
Computer Science	18.64	5.39	22
English and Linguistics	12.20	3.14	20
Accounting	11.40	2.63	10
Library and Information Science	13.50	3.42	8
Sociology	10.14	1.77	7
Engineering	13.89	3.86	9
Health and Service (Administration & Research)	12.67	4.84	6
Business Administration	14.80	3.96	5
Statistics	14.17	1.60	6
Economics	16.50	7.94	4
Law	11.75	2.75	4
Education	14.67	8.96	3
Journalism and Mass Communications	11.50	2.39	4

Table 4.15
Frequency of Use and Integration of Telecommunications

Telecommunications	No Use		Limited Use		Moderate Use		Frequent Use	
	No.	%	No.	%	No.	%	No.	%
Electronic Mail	69	35.8	43	22.3	32	16.6	48	24.9
Voice Mail	148	76.7	28	14.5	6	3.1	10	5.2
Electronic Bulletin Boards	151	77.7	23	11.9	13	6.7	5	2.6
Local Area Network	80	41.5	37	19.2	34	17.6	41	21.2
The Internet	156	80.8	24	12.4	9	4.7	2	1.0
World Wide Web (WWW)	164	85.0	18	9.3	5	2.6	4	2.1
Distance Education	150	77.7	23	11.9	13	6.7	5	2.6
Teleconferencing	165	85.5	17	8.8	6	3.1	3	1.6
Telecommuting	161	83.4	20	10.4	6	3.1	4	2.1

Hypothesis 3

There is no statistically significant difference between faculty members from different fields of specialty in use and integration of computer and computer-related technology (hardware) into their personal and professional tasks at the Institute of Public Administration in Saudi Arabia.

A repeated measure analysis of variance (ANOVA) was conducted on the faculty responses to the hardware in order to test the third hypothesis. The ANOVA yielded the following results :

1. The main effect for fields was significant, $F(14,178) = 2.66$, $MSE = 2.25$, $p < .05$.

2. The main effect for hardware was significant, $F(7,1246) = 37.98$, $MSE = .46$, $p < .05$.

3. The interaction effect (fields by hardware) was significant, $F(98,1246) = 1.66$, $MSE = .46$, $p < .001$.

Given the above main effects for fields, main effect for hardware, and interaction effect for fields by hardware observed, Tukey-HSD mean comparisons were then employed to locate the significant differences between fields. Faculty members in Computer Science reported that they used and integrated computer and computer-related technology (hardware) more than faculty members in Sociology, Accounting, Public Administration, and Business Education.

Tukey-HSD mean comparisons were then employed to locate the significant differences for the interaction effect of fields by hardware. Faculty members in Library and Information Science and Computer Science used and integrated CD-ROM more than faculty members in Sociology and Business Education. Faculty members in Computer Science also used and integrated CD-ROM more than faculty members in Public Administration.

Faculty members in Computer Science used and integrated local area networks more than faculty members in Accounting, Sociology, English and Linguistics, Public Administration, and Business Education. Faculty members in Computer Science used and integrated modems more than faculty members in Business Education and Public Administration. Faculty members in English and Linguistics used and integrated modems more than faculty members in Business Education

Further descriptive analysis using frequencies was conducted on the use and integration of computer and computer-related technology (hardware) by all respondents (Table 4. 17). The results indicated that the most frequently used hardware was CD-ROM. The results also revealed that a relatively high percentage of the respondents, ranging from 56.5% to 85.0%, reported no use of the following hardware: digital camera, camcorder, LCD panels, laserdiscs, video cassette recorder-player, scanner, and modem.

Table 4.16
Respondents by Field Summary Table (Hardware Section)

Hardware	*M*	*SD*	n
Business Education	11.90	5.13	41
Public Administration	11.75	3.63	44
Computer Science	16.64	4.54	22
English and Linguistics	12.55	3.95	20
Accounting	10.50	1.65	10
Library and Information Science	16.13	4.12	8
Sociology	9.23	1.51	7
Engineering	14.11	3.89	9
Health and Service (Administration & Research)	12.17	3.54	6
Business Administration	13.20	5.22	5
Statistics	12.00	2.97	6
Economics	14.25	6.02	4
Law	12.75	7.09	4
Education	14.00	5,20	3
Journalism and Mass Communications	11.50	3.87	4

Table 4.17
Frequency of Use and Integration of Hardware

Hardware	No Use		Limited Use		Moderate Use		Frequent Use	
	No.	%	No.	%	No.	%	No.	%
CD-ROM	41	21.2	50	25.9	48	24.9	52	26.9
Scanners	121	62.7	49	25.4	16	8.3	6	3.1
LCD Panels	146	75.6	28	14.5	15	7.8	3	1.6
Camcorder (Video Camera)	151	78.2	23	11.9	12	6.2	5	2.6
Video Cassette Recorder	123	63.7	24	12.4	29	15.0	16	8.3
Digital Camera	164	85.0	20	10.4	6	3.1	2	1.0
Laserdiscs	136	70.5	34	17.6	13	6.7	8	4.1
Modem	109	56.5	45	23.3	18	9.3	20	10.4

Hypothesis 4

There is no statistically significant difference between faculty members from different fields of specialty in their attitudes toward using and integrating computer and computer-related technology into their personal and professional tasks.

A multivariate analysis of variance (MANOVA) was conducted on faculty responses to the attitude statements in order to test the fourth hypothesis. The MANOVA yielded no significant differences on how faculty members in different fields of specialty at the IPA feel about the use and integration of computer and computer-related technology into their personal and professional tasks, $F(14, 178) = .33$, $MSE = 48.33$, $p = .330$.

Further descriptive analysis using frequencies was conducted on how the faculty members at the IPA in different fields feel about using and integrating computer and computer-related technology into their personal and professional tasks. The results indicated that faculty members at the IPA have positive attitudes toward the use and integration of computer and computer-related technology into their personal and professional tasks (Table 18).

Of the respondents, 88% think that computer and computer-related technology make learning more interesting, easier, and more appealing to students. Of the respondents, 86% think that the institution should provide faculty and staff members with on-going training programs in computer and computer-related technology in order to upgrade their skills and to keep them updated. Of the respondents, 86% indicated that computer and computer-related technology should be used as a tool for enhancing teaching/learning. Of the respondents, 85% indicated that computer and computer-related technology should be used by all teachers in all fields.

Of the respondents, 81% feel that they need more training in order to have more understanding and become more aware of the effect of using computer and computer-related technology for their professional work. Of the respondents, 75% think it is their responsibility to acquire the necessary knowledge and skills in using and integrating computer and computer-related technology into their personal work, and 56% think it is their employer's responsibility to help them acquire the necessary knowledge and skills in using and integrating computer and computer-related technology into their personal work. The average of the overall respondents' answers to the attitudes section were: 43% strongly agree, 36% agree, 14% undecided, 6% disagree, and 1% strongly disagree.

Table 4.18
Frequencies of Attitudes

Statement	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
I feel comfortable using the computer and computer-related technology in my personal work	1	12	19	62	97
I feel comfortable using the computer and computer-related technology for my professional work	–	11	22	62	95
Computer and computer-related technology should be used by all teachers in all fields	1	4	24	57	103
Computer and computer-related technology should be used as a tool for enhancing teaching/learning	1	3	22	68	97
I think computers and computer-related technology make learning more interesting, easier, and more appealing to students	–	4	18	74	95
I think incorporating computer and computer-related technology into the curriculum makes my job easier and facilitates the learning process	1	5	43	73	66
I feel I need more training in order to have more understanding and become more aware of the effect of using computer and computer-related technology for my professional work	5	18	14	64	90
I think it is my responsibility to acquire the necessary knowledge and skills in using and integrating computer and computer-related technology into my personal work	2	13	33	83	59
I think it is my responsibility to acquire the necessary knowledge and skills in using and integrating computer and computer-related technology into my professional work	4	35	44	69	38
I think it is my employer's responsibility to help me acquire the necessary knowledge and skills in using and integrating computer and computer-related technology into my professional work	9	22	30	75	53
I think that the institution should provide faculty and staff members with on going training programs in computer and computer-related technology in order to upgrade their skills and to keep them updated	–	6	20	60	10
TOTAL	24	133	289	747	898
%	1%	6%	14%	36%	43%

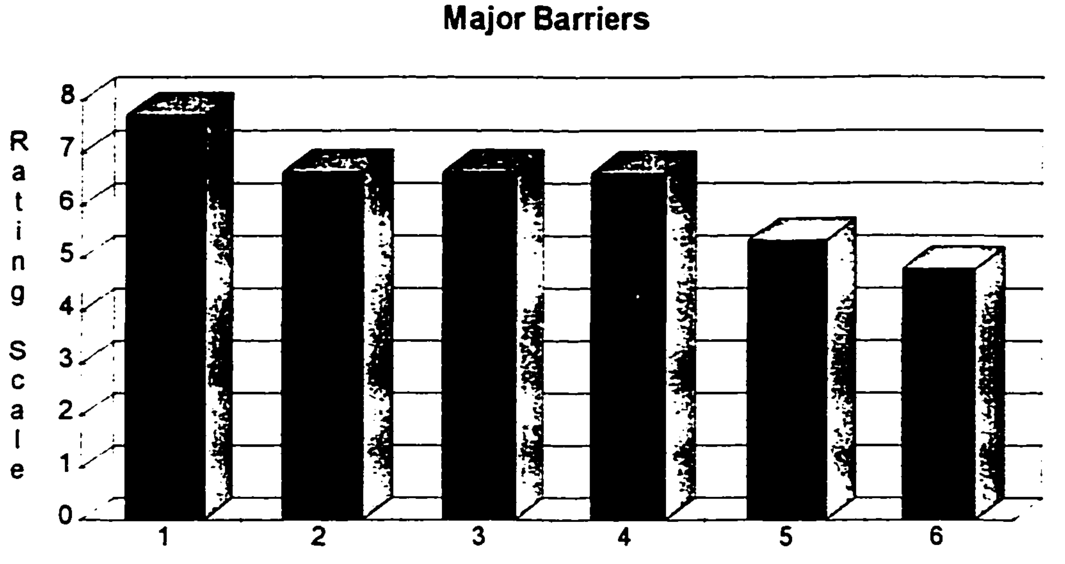
Hypothesis 5

There is no statistically significant difference between faculty members from different fields of specialty in what they consider to be the major barriers that impede the use and integration of computer and computer-related technology into their professional tasks.

A multivariate analysis of variance (MANOVA) was conducted on faculty responses in order to test the fifth hypothesis. The MANOVA yielded no significant differences in what the faculty members at the IPA considered to be the major barriers that impede the use and integration of computer and computer-related technology into their professional tasks, $F(14, 172) = .65$, $MSE = 84.09$, $p = .821$.

Further descriptive analysis using frequencies was conducted on what the IPA faculty members considered to be the major barriers that impede the use and integration of computer and computer-related technology into their professional tasks. The results indicated that faculty members at the IPA rated lack of training as the first major barrier with 20.4%. Lack of administrative support and lack of time were both rated as the second major barriers with 17.6% for each. Lack of available software was rated as the fourth major barrier with 17.5%, lack of technical support as the fifth major barrier with 14.7%, and lack of self-confidence as the least major barrier with 12.7% (Figure 4.1).

Figure 4.1
Rating of Major Barriers on a Scale of 1-10



1. Lack of Training (M = 6.711)

2. Lack of Administrative Support (M = 6.631)

3. Lack of Time (M = 6.631)

4. Lack of Software and Hardware (M = 6.605)

5. Lack of Technical Support (M = 5.342)

6. Lack of Self-Confidence (M = 4.790)

Discussion

The results of the research revealed that faculty members in different fields of specialty vary in their use and integration of computer and computer-related technology (applications, telecommunications, and hardware) Faculty members in Computer Science seemed to have used and integrated computer and computer-related technology more than faculty members in many of the other fields included in this research. The research findings of word processing as the most frequently used and integrated application supports other studies' findings discussed in the review of literature. Electronic mail was the most frequently used telecommunication, and CD-ROM was the most frequently used hardware.

The results indicated that the Institute of Public Administration faculty members had positive attitudes toward the use and integration of computer and computer-related technology into their personal and professional tasks. The results of the research indicated that faculty members rated lack of training as the first major barrier that impeded them from using and integrating computer and computer-related technology into their professional tasks.

The results of the research also revealed that the IPA faculty members rated lack of administrative support and lack of time, equally, as the second major barriers that impeded them from using and integrating computer and computer-related technology into their professional tasks. The combination of lack of administrative support and lack of time strongly support the other studies discussed in the review of literature where faculty should be provided with incentives and release time in order to allow them to attend training programs, seminars, workshops, and conferences. The results showed that 20.7% of the respondents learned how to use computers by self-teaching which supports the notion that if educators were to be freed from doing unnecessary and routine tasks they might be encouraged to devote more time for training and experimenting with technology.

In addition to the consistency of the major findings of this research with other studies, it provided quite a sufficient inventory for the IPA in particular and for similar institutions in general regarding the use and integration of computer and computer-related technology by faculty members in different fields of specialty, faculty attitudes toward such integration, and their rating of the major barriers that impeded them from using and integrating technology into their professional tasks. The attribute of this study which evaluated the current use and integration of computer and computer-related technology should assist in current and future planning and implementation of faculty training and development programs.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

In order to prepare today's graduates in all levels and in all fields for the 21st century, educators need to be technologically literate. International competition has increased the demands for more qualified and skillful graduates to work and operate in a very technologically advanced world. The institutional evaluation of the current state of use and integration of computer and computer-related technology would assist in planning and implementing appropriate training programs and in providing necessary administrative, financial, and technical support to enhance and broaden the use of technology by faculty.

This study had three purposes. Those were: (a) to evaluate the current state of use and integration of computer and computer-related technology applications, telecommunications, and hardware by the faculty members into their personal and professional tasks at the Institute of Public Administration (IPA) in Saudi Arabia; (b) to see how the IPA faculty members felt about using and integrating computer and computer-related technology into their personal and professional tasks; and (c) to find out what the IPA faculty members considered to be the major barriers that impeded the use and integration of computer and computer-related technology into their professional tasks.

A survey was used to collect data from the IPA faculty members headquarters in Saudi Arabia. Of all IPA headquarters faculty members, 193 completed and returned the survey. The response rate was 62.05%. Five hypotheses were addressed.

Hypothesis 1

The first hypothesis was: There is no statistically significant difference between faculty members from different fields of specialty in the use and integration of computer and computer-related technology (applications) into their personal and professional tasks at the Institute of Public Administration in Saudi Arabia. This hypothesis was rejected.

A repeated measure analysis of variance (ANOVA) was conducted on the faculty responses to the applications in order to test the first hypothesis. There was a significant main effect for fields. There was a significant main effect for applications. There was a significant interaction effect for fields by applications.

Tukey-HSD mean comparisons were then employed to locate the significant differences between fields. Faculty members in Computer Science and Engineering reported that they used and integrated computer and computer-related technology (applications) more than faculty members in Sociology. Also, faculty members in Computer Science reported that they used and integrated computer and computer-related technology (applications) more than faculty members in Business Education.

Tukey-HSD mean comparisons were also employed to locate the significant differences for the interaction effect of fields by applications. Faculty members in Business Education, Computer Science, and English and Linguistics used and integrated word processing more than faculty members in Sociology.

Faculty members in Accounting and Engineering used and integrated spreadsheets more than faculty members in Law, Sociology, Library and Information Science, Public Administration, and English and Linguistics. Faculty members in Computer Science used and integrated spreadsheets more than faculty members in Law, Sociology, Public Administration, and English and Linguistics. Faculty members in Statistics used and integrated spreadsheets more than faculty members in Law and Sociology.

Faculty members in Engineering used and integrated presentation software more than faculty members in Law, English and Linguistics , Library and Information Science, and Public Administration. Also, faculty members in Computer Science used and integrated presentation software more than faculty members in Law, English and Linguistics, and Public Administration.

Faculty members in Engineering used and integrated simulation programs more than faculty members in Library and Information Science, Accounting, Business Education, and Public Administration.

Faculty members in Statistics used and integrated statistics programs more than faculty members in Law, English and Linguistics, Sociology, Accounting, and Computer Science. Faculty members in Economics used and integrated statistics programs more than faculty members in Law and English and Linguistics. Faculty members in Statistics, Computer Science, Public Administration, Engineering, Economics, and Health Service used and integrated statistics programs more than faculty members in Business Education.

Faculty members in Engineering used and integrated graphics programs more than faculty members in Business Education. Sociology, Accounting, Library and Information Science, English and Linguistics, and Public Administration. Faculty members in Computer Science used and integrated graphics programs more than faculty members in Business Education. Faculty members in Engineering used and integrated computer aided design (CAD) programs more than faculty members in Business Education, Public Administration, Computer Science. English and Linguistics, Accounting, Library and Information Science, Sociology, Health Service, Business Administration, Statistics, Economics, Law, and Journalism and Mass Communications.

Further descriptive analysis using frequencies was conducted on the use and integration of computer and computer-related technology (applications) by all respondents. The results indicated that word processing was the most frequently used application.

Hypothesis 2

The second hypothesis was: There is no statistically significant difference between faculty members from different fields of specialty in the use and integration of computer and computer-related technology (telecommunications) into their personal and professional tasks at the Institute of Public Administration in Saudi Arabia. This hypothesis was rejected.

A repeated measure analysis of variance (ANOVA) was conducted on the faculty responses to the telecommunications in order to test the second hypothesis. There was a significant main effect for fields. There was a significant main effect for telecommunications. There was a significant interaction effect for fields by telecommunications.

Tukey-HSD mean comparisons were then employed to locate the significant differences between fields. Faculty members in Computer Science used and integrated computer and computer-related technology (telecommunications) more than faculty members in Sociology, Accounting, Business Education, English and Linguistics, and Public Administration.

Tukey-HSD mean comparisons were also employed to locate the significant differences of the interaction effect of fields by telecommunications. Faculty members in Computer Science used and integrated electronic mail more than faculty members in Health Service, Education, Sociology, Business Education, Law, Accounting, and Public Administration. Faculty members in English and Linguistics used and integrated electronic mail more than faculty members in Business Education.

Faculty members in Computer Science used and integrated electronic bulletin boards more than faculty members in Sociology, Accounting, Journalism and Mass Communications, Business Education, English and Linguistics, and Public Administration.

Faculty members in Computer Science used and integrated local area networks more than faculty members in Health Service, English and Linguistics, Sociology, Law, Journalism and Mass Communications, Public Administration, Accounting, and Engineering. Faculty members in Statistics used and integrated local area network more than faculty members in Health Service and English and Linguistics. Faculty members in Library and Information Science used and integrated local area network more than faculty members in English and Linguistics.

Faculty members in Computer Science used and integrated the Internet more than faculty members in Business Education. Faculty members in Computer Science used and integrated the World Wide Web (WWW) more than faculty members in Business Education.

Further descriptive analysis using frequencies was conducted on the use and integration of computer and computer-related technology (telecommunications) by all respondents. The results indicated that electronic mail was the most frequently used telecommunications.

Hypothesis 3

The third hypothesis was: There is no statistically significant difference between faculty members from different fields of specialty in use and integration of computer and computer-related technology (hardware) into their personal and professional tasks at the Institute of Public Administration in Saudi Arabia. This hypothesis was rejected.

A repeated measure analysis of variance (ANOVA) was conducted on the faculty responses to the hardware in order to test the third hypothesis. There was a significant main effect for fields. There was a significant main effect for hardware. There was a significant interaction effect for fields by hardware.

Tukey-HSD mean comparisons were then employed to locate the significant differences between fields. Faculty members in Computer Science reported that they used and integrated computer and computer-related technology (hardware) more than faculty members in Sociology, Accounting, Public Administration, and Business Education.

Tukey-HSD mean comparisons were then employed to locate the significant differences for the interaction effect of fields by hardware. Faculty members in Library and Information Science and Computer Science used and integrated CD-ROM more than faculty members in Sociology and Business Education. Faculty members in Computer Science also used and integrated CD-ROM more than faculty members in Public Administration.

Faculty members in Computer Science used and integrated local area networks more than faculty members in Accounting, Sociology, English and Linguistics, Public Administration, and Business Education. Faculty members in Computer Science used and integrated modems more than faculty members in Business Education and Public Administration. Faculty members in English and Linguistics used and integrated modems more than faculty members in Business Education.

Further descriptive analysis using frequencies was conducted on the use and integration of computer and computer-related technology (hardware) by all respondents. The results indicated that CD-ROM was the most frequently used hardware.

Hypothesis 4

The fourth hypothesis was: There is no statistically significant difference between faculty members from different fields of specialty in their attitudes toward using and integrating computer and computer-related technology into their personal and professional tasks. This hypothesis was retained.

A multivariate analysis of variance (MANOVA) was conducted on faculty responses to the attitudes in order to test the fourth hypothesis. The MANOVA yielded no significant differences on how faculty members in different fields of specialty at the IPA feel about the use and integration of computer and computer-related technology into their personal and professional tasks.

Further descriptive analysis using frequencies was conducted on how the faculty members at the IPA in different fields feel about using and integrating computer and computer-related technology into their personal and professional tasks. The results indicated that faculty members at the IPA have positive attitudes toward the use and integration of computer and computer-related technology into their personal and professional tasks.

Hypothesis 5

The fifth hypothesis was: There is no statistically significant difference between faculty members from different fields of specialty in what they consider to be the major barriers that impede the use and integration of computer and computer-related technology into their professional tasks. This hypothesis was retained.

A multivariate analysis of variance (MANOVA) was conducted on faculty responses in order to test the fifth hypothesis. The MANOVA yielded no significant differences in what the faculty members at the IPA considered to be the major barriers that impede the use and integration of computer and computer-related technology into their professional tasks.

Further descriptive analysis using frequencies was conducted on what the IPA faculty members considered to be the major barriers that impede the use and integration of computer and computer-related technology into their professional tasks. The results indicated that faculty members at the IPA rated (a) lack of training as the first major barrier; (b) both lack of administrative support and lack of time as the second major barriers; (c) lack of available software and hardware as the fourth major barrier; (d) lack of technical support as the fifth major barrier; and (e) self-confidence as the least major barrier.

Conclusions

Today's educators are more aware than ever of the positive impact of using and integrating computer and computer-related technology into their personal and professional tasks. Using and integrating computer and computer-related technology as a teaching/learning tool facilitates the learning process and makes learning more interesting, easier, and more appealing to students. However, institutions need to evaluate the current state of use and integration of computer and computer-related technology by their faculty members in order to plan, develop, and implement appropriate training programs for their faculty members in all fields; to provide them with more free time by reducing the unnecessary paper and routine tasks; and to provide them with the necessary administrative, financial, and technical support.

It is recommended that institutions should provide their faculty members with training programs in technology, give more release and free time, provide more administrative and technical support, and provide the needed software and hardware.

Recommendations

The current demands for preparing every student to be technologically literate puts more challenge and more expectations on educational and training institutions.

Faculty members and their important roles in either teaching technology or using technology as a teaching/learning tool are crucial to satisfying such demands.

Educational and training institutions should consider the following recommendations. Institutions should:

1. Evaluate the current state of faculty members use and integration of computer and computer-related technology.

2. Evaluate how faculty members feel about the use and integration of computer and computer-related technology.

3. Identify the major barriers that impede faculty members from using and integrating computer and computer-related technology.

4. Design and conduct appropriate training programs in computer and computer-related technology for faculty members.

5. Provide faculty members with appropriate administrative, financial, and technical support.

6. Provide faculty members with more release time and reduce their paper and routine work.

7. Provide all faculty members with computers and with full connectivity.

8. Provide sufficient information and up-to-date software and hardware.

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APPENDIX A

INSTITUTIONAL REVIEW BOARD APPROVAL FORM

INSTITUTIONAL REVIEW BOARD APPROVAL FORM
FOR THE PROTECTION OF HUMAN SUBJECTS IN RESEARCH
MISSISSIPPI STATE UNIVERSITY

STATEMENT OF BOARD: **IRB DOCKET #** 97-034

This is to certify that the research proposal entitled Use and Integration of Computer and Computer-Related Technology by Faculty members at the IPA in Saudi Arabia

and submitted by: Name: Abdullah S. Al-Weshail

Department: Technology Education

Name of Advisor: Dr. John Perry

to Sponsored Programs Administration for consideration has been reviewed by the Regulatory Compliance Officer or the IRB and approved with respect to the study of human subjects as appropriately protecting the rights and welfare of the individuals involved, employing appropriate methods of securing informed consent from these individuals and not involving undue risk in the light of potential benefits to be derived therefrom.

Administrative Approval Date: February 28, 1997

____(A) Contingent upon receipt of ____

__X__(B) All necessary documents were received.

Expedited Approval Date: ____

____(A) Contingent upon receipt of ____

____(B) All necessary documents were received.

Full Board Approval Date: ____

____(A) Contingent upon receipt of ____

____(B) All necessary documents were received.

Robyn B. Remotigue — February 28, 1997

Robyn B. Remotigue, MSU Regulatory Compliance Officer **Date**

____

Institutional Review Board Member **Date**

(revised form 8/96)

APPENDIX B

QUESTIONNAIRE

February 26, 1997

Dear colleague

Thank you in advance for taking the time to respond to this questionnaire. My name is Abdullah Al-Weshail and I am an IPA faculty member. Currently, I am working towards a Ph.D. with emphasis in Business Technology in the Department of Technology and Education at Mississippi State University. This questionnaire is designed specifically to gather the information needed for the study regarding the use and integration of computer and computer-related technology by faculty members at the IPA.

Your participation is voluntary, and I would value very highly your responses. The survey will take approximately 12 minutes to complete. The study is designed for purely educational purpose; however, the results may assist in future planning for faculty training and development, especially in technology related areas.

Your responses will be analyzed in groups and will be handled with complete anonymity. You may be confident that the completed questionnaire will not be associated with your name.

For your convenience, please return the completed questionnaire in the attached envelope by April 15, or sooner if possible. Your time and cooperation are genuinely appreciated.

Sincerely

Abdullah Sulaiman Al-Weshail
Mississippi State University
Mississippi State, Mississippi

Section I. Faculty Demographics

1. Please indicate your field of specialty ....

For each of the following questions, please CHECK (·) the item that best describes your response.

2. Qualification:
 ---- a. Ph.D.
 ---- b. Ed. D.
 ---- c. Masters
 ---- d. Bachelors
 ---- e. Diploma
 ---- f. Other, please specify ....

3. The last degree was pursued in which of the following countries
 ---- a. Saudi Arabia
 ---- b. The United States of America
 ---- c. Britain
 ---- d. Canada
 ---- e. Other, please specify ....

4. Number of years in teaching experience
 ---- a. 5-years or less
 ---- b. 6 - 10 years
 ---- c. 11 - 15 years
 ---- d. 16 - 20 years
 ---- e. More than 20 years

5. Have you conducted a consultation(s) in your field of specialty?
 ---- a. Yes
 ---- b. No

6. Have you conducted research in your field of specialty?
 ---- a. Yes
 ---- b. No

7. Do you own a computer?
 ---- a. Yes
 ---- b. No

8. Do you have a computer in your office provided by your department?
 ---- a. Yes
 ---- b. No

9. Do you have an access to a computer at work?
 ---- a. Yes
 ---- b. No

10. What kind of computer do you prefer to use the most?
 ---- a. Macintosh
 ---- b. IBM IBM compatible
 ---- c. No real preference
 ---- d. Other, please specify ....

11. How did you learn to use the computer?
 ---- a. Attended an academic course
 ---- b. Attended a training program
 ---- c. Assisted by a colleague or a friend
 ---- d. Self-taught
 ---- e. Other, please specify ....

<u>*Section II. Using and Integrating Computer-Related Technology (Applications) Into Your Professional Tasks.*</u>

Please indicate your current **use and integration** of computer and computer-related technology (***applications***) into your **personal and professional work** by *CIRCLING* the number that best describes your response to each item referenced to the scale below:

1	2	3	4
No use	**Limited Use**	**Moderate Use**	**Frequent Use**

1. Word processing applications (e.g. *WordPerfect, Microsoft Works*)	1	2	3	4
2. Database applications (e.g. *Dbase, Microsoft Works*)	1	2	3	4
3. Spreadsheets applications (e.g. *Lotus, Excel, Microsoft Works*)	1	2	3	4
4. Desktop publishing (e.g. *Pagemaker, Microsoft Publisher*)	1	2	3	4
5. Teacher utility programs (e.g. *Gradebooks, Attendance*)	1	2	3	4
6. Presentation programs (e.g. *PowerPoint, Compel*)	1	2	3	4
7. Hypermedia programs (e.g. HyperCard, HyperStudio)	1	2	3	4
8. Tutorial programs (e.g. *Typing Tutorial*)	1	2	3	4
9. Drill programs (e.g. *EMC Keyboarding & Applications*)	1	2	3	4
10. Simulation programs (performance model software for training in general areas such as supervising, presentations, flying an airplane)	1	2	3	4
11. Statistical programs (e.g. *SPSS*)	1	2	3	4
12. Graphics programs (e.g. *Harvard Graphics, Print Shop*)	1	2	3	4
13. Computer Aided Design (CAD) programs (e.g. *AutoCad*)	1	2	3	4
14. Career information systems (e.g. *Career Path Planner*)	1	2	3	4
15. Decision support systems (a computer application that simulates the human reasoning process by applying specific knowledge and inferences of experts' perspectives that assists in solving problems and making decisions)	1	2	3	4

Section III. Use and Integration of Computer-Related Technology (Telecommunications)

Please indicate your current **use and integration** of computer and computer-related technology (***Telecommunications***) into your **personal and professional work** by *CIRCLING* the number that best describes your response to each item referenced to the scale below:

1	2	3	4
No Use	**Limited Use**	**Moderate Use**	**Frequent Use**

1. Electronic mail 1 2 3 4
2. Voice mail.......... 1 2 3 4
3. Electronic Bulletin Boards.......... 1 2 3 4
4. Local area network.......... 1 2 3 4
5. The Internet browsers (e.g., Telnet, Gopher, FTP).......... 1 2 3 4
6. World Wide Web (WWW) browsers (e.g., Netscape, Internet Explorer).......... 1 2 3 4
7. Distance Education (Audio, Video, TV based).......... 1 2 3 4
8. Teleconferencing.......... 1 2 3 4
9. Telecommuting.......... 1 2 3 4

Section IV: Use and Integration of Computer-Related Technology (Hardware)

Please indicate your current **use and integration** of computer and computer-related technology (***Hardware***) into your **personal and professional work** by *CIRCLING* the number that best describes your response to each item referenced to the scale below.

1	2	3	4
No use	**Limited Use**	**Moderate Use**	**Frequent Use**

1. CD-ROM.......... 1 2 3 4
2. Scanners.......... 1 2 3 4
3. LCD Panels/Projection Systems.......... 1 2 3 4
4. Camcorder (Video Camera).......... 1 2 3 4
5. VCR (Video Cassette Recorder-Player).......... 1 2 3 4
6. Digital Camera.......... 1 2 3 4
7. Laserdiscs.......... 1 2 3 4
8. Modem.......... 1 2 3 4
9. Others, please specify below:.......... 1 2 3 4

   .... 1 2 3 4

Section V. Attitudes Toward Computer and Computer-Related Technology

Please indicate how you **feel about using and integrating** computer and computer-related technology into your personal and professional work by *CIRCLING* the number that best describes your response to each item referenced to the scale below.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Undecided**	**Agree**	**Strongly Agree**

1. I feel comfortable *using* the computer and computer-related technology in my personal work 1 2 3 4 5

2. I feel comfortable *using* the computer and computer-related technology for my professional work 1 2 3 4 5

3. Computer and computer-related technology should be *used* by all teachers in all fields 1 2 3 4 5

4. Computer and computer-related technology should be *used* as a tool for enhancing teaching/learning 1 2 3 4 5

5. I think computers and computer-related technology make learning more interesting, easier, and more appealing to students 1 2 3 4 5

6. I think incorporating computer and computer-related technology into the curriculum makes my job easier and facilitates the learning process 1 2 3 4 5

7. I feel I need more training in order to have more understanding and become more aware of the effect of using computer and computer-related technology for my *professional work* 1 2 3 4 5

8. I think it is my responsibility to acquire the necessary knowledge and skills in using and integrating computer and computer-related technology into my *personal work* 1 2 3 4 5

9. I think it is my responsibility to acquire the necessary knowledge and skills in using and integrating computer and computer-related technology into my *professional work* 1 2 3 4 5

10. I think it is my employer's responsibility to help me acquire the necessary knowledge and skills in using and integrating computer and computer-related technology into my *professional work* 1 2 3 4 5

11. I think that the institution should provide faculty and staff members with on going training programs in computer and computer-related technology in order to upgrade their skills and to keep them updated........ 1 2 3 4 5

Section VI. Major Barriers in Using Computer and Computer-Related Technology:

On a scale of 1 to 10 (1 is no barrier and 10 is an absolute barrier), please CIRCLE the number that best describes ***your feelings*** of how you consider each of the items below to be **a barrier** that impedes the use and integration of computer and computer-related technology into **your professional work**.

a. Lack of training on how to use and integrate computer and computer-related technology into the curriculum.

1 2 3 4 5 6 7 8 9 10
No Barrier Absolute Barrier

b. Lack of available software and hardware.

1 2 3 4 5 6 7 8 9 10
No Barrier Absolute Barrier

c. Lack of time to learn, experiment and practice.

1 2 3 4 5 6 7 8 9 10
No Barrier Absolute Barrier

d. Lack of personal confidence and interest to use computer and computer-related technology.

1 2 3 4 5 6 7 8 9 10
No Barrier Absolute Barrier

e. Lack of administrative support.

1 2 3 4 5 6 7 8 9 10
No Barrier Absolute Barrier

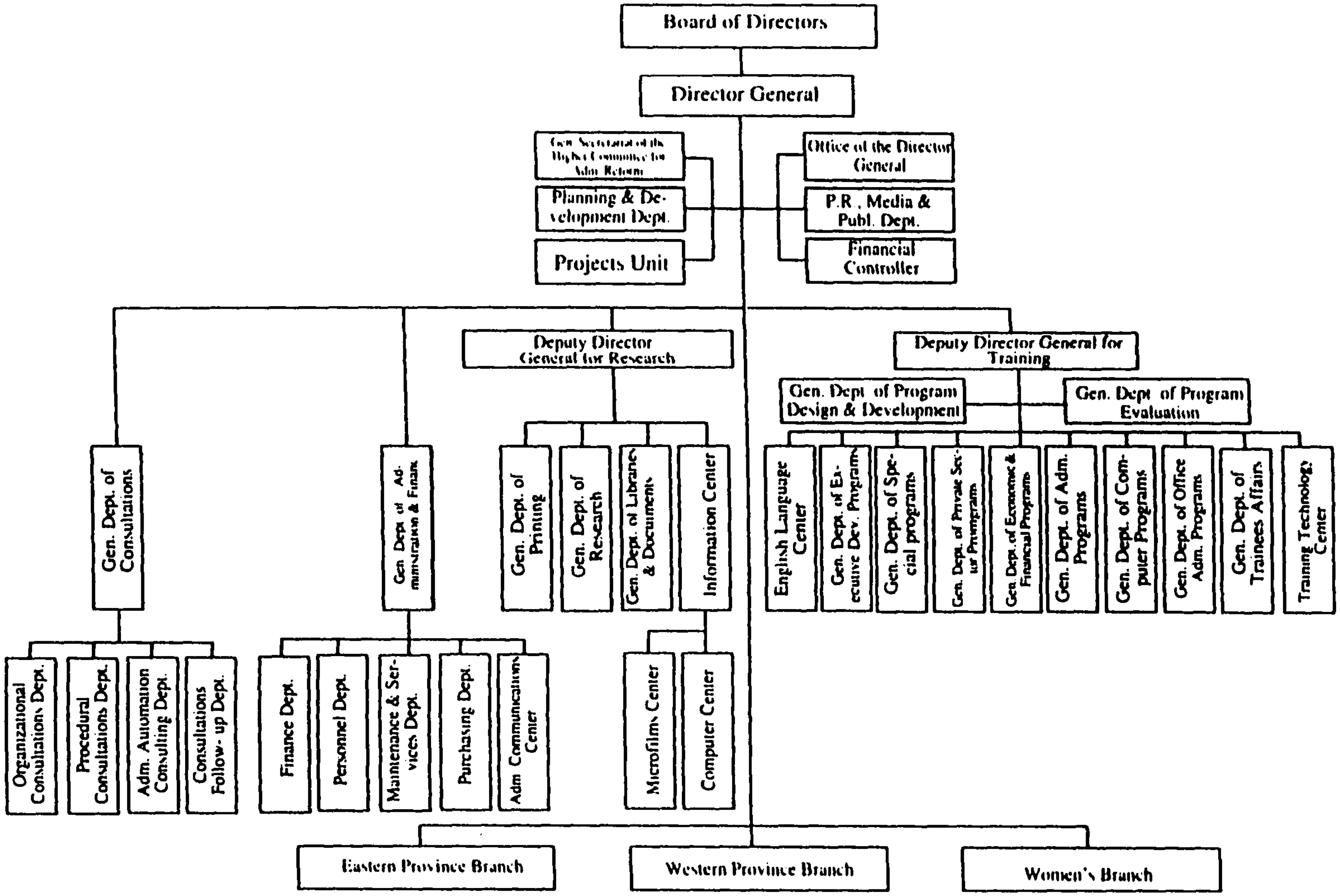
f. Lack of technical support.

1 2 3 4 5 6 7 8 9 10
No Barrier Absolute Barrier

Thank you. End of Questionnaire.

APPENDIX C

THE INSTITUTE OF PUBLIC ADMINISTRATION ORGANIZATIONAL CHART



Source: Institute of Public Administration: Objectives & Activities. (1995).