THE UNIVERSITY OF HULL

An Investigation of the Computer Training Needs of the Teachers and Students at Teacher Colleges in Saudi Arabia

Being a Thesis submitted for the Degree of
Doctor of Philosophy
in the University of Hull

by
Mohammed Ghazi Mohammed Al-Joudi
BA (1974) King Abdulaziz University (KSA)
MA (1980) San Diego State University (USA)

(July: 2000)

Abstract

Worldwide discussion has been initiated about the role of computers and information technology in schools. In Saudi Arabia, the introduction of computers into education institutes has been a feature of development planning since 1990, but many educationalists assert that the technology is underestimated and blame inadequate teacher preparation.

The main purpose of this study was to investigate the computer experience, computer knowledge, computer training needs and attitude toward computers of Teacher College teaching staff and students in Saudi Arabia. It also examines the availability of human and physical resources for appropriate training in this area.

The survey sample was 147 teaching staff and 472 students drawn from all departments and levels of study in five men's Teacher Colleges, one from each of the five regions of the country. In addition, a small number of policy- makers (e.g. college deans and ministry officials) were interviewed.

Data were collected via a questionnaire survey, using an instrument adapted from Fodah (1990), containing multiple- choice questions on computer experience, knowledge and training needs, and a 5- part Likert-type attitude scale. Information on computer courses, resources and related policy were addressed by semi-structured interviews. Lack of access to computers, deficiencies in computer knowledge and low computer experience were found among staff and students. Lack of computer training appears to be one of the main causes of low utilization; inadequate material and human resources are another obstacle. Nevertheless, both groups had positive attitudes to computers.

If Saudi Arabia is to keep abreast of the information revolution, Teacher Colleges need a high level of equipment and service infrastructure, and well-prepared computer teachers and staff capable of training their colleagues and students to integrate computers in teaching and learning.

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Acknowledgments

Great thanks to God the most merciful for giving me the health, help and patience to complete this task.

This study could not have been brought to fruition without the support of a number of people, to whom I owe a debt of gratitude.

I am especially grateful to my supervisor, Mr. Ken Spencer of the Centre for Education Studies, Hull University, for his valuable advice and constant encouragement; and to the senior lecturer, Dr.J.L. Moore, for his scholarly example and stimulating discussions. Many thanks also to Professor Richard Andrews, Head of the Centre for Professional Development and Training in education and Dr. Mike Bottery, Head of the Centre for Education Studies, for their valuable seminars during my study period and to Mr. Alan Reese for his patient help with statistical procedures.

I am grateful to the Deputy Minister for Teacher Colleges in the Saudi Arabian Ministry of Education, Dr Mohammed Nour Al-Saig, and to the staff of the department for their great help in facilitating the field work.

My thanks to the people in Taif Teacher College, particularly Dr. Salem Al-Gorashi, the college dean and the two previous and current deputy deans and my other colleagues, for their assistance in preparing for the field work. I also thank the people in the other Teacher Colleges where the field- work was conducted, Riyadh, Dammam, Tabouk and Jazan, for their co-operation in the field study.

I am very grateful to the officials in the Saudi Embassy and in the Saudi Arabian Culture Bureau in the United Kingdom, for their co-operation with administrative procedures.

Great thanks to Ms Kathryn Spry for proof-reading and editing the thesis.

I wish to express my profound gratitude to my mother and father for their sacrifices for me, to my wife and my children for their encouragement, unlimited support and patience and to my brothers, sister and friends, for their prayers for me.

Frequent Abbreviations

CCT	Computer Course Teacher
CSS	Computer Studies Supervisor
DDMTC	Department of the Deputy Minister for Teacher Colleges
DM	Decision Makers
DMTC	Deputy Minister for Teacher Colleges
ED	Educational Departments
FTP	File Transfer Protocol
GOTEVT	General Organisation of Technical Education and Vocational Training
GPGE	General Presidency for Girls' Education
GSGC	General Secretary for Girls' Colleges
HTML	Hypertext Markup Language
ICT	Information and Communications Technology
IT	Information Technology
ITT	Institute of Teacher Training
KSA	Kingdom of Saudi Arabia
PD	Practical Departments
PGCE	Post-Graduate Certificate in Education
SA	Saudi Arabia
SAD	Students' Affairs Dean
SD	Scientific Departments
SRD	Science Research Dean
TC	Teacher College
TCA	Teacher College Administration
TCC	Teacher Colleges Committee
TD	Theoretical Departments
TED	Taif Educational District
TEDD	Taif Educational District Director
TS	Teaching Staff
TTCD	Taif Teacher College Dean
VDRTC	Vice Dean of Riyadh Teacher College

CHAPTER ONE
INTRODUCTION TO THE STUDY

CHAPTER 1

Introduction to the Study

1.1 Introduction:

Technology in education has a longer history than is often realised. Spoken language was captured in written form, probably 5,000 years ago, and this provided a major impetus to the educational process (Spencer, 1996). Printing expanded the role of the written word from the 15^{th} century onwards and the supremacy of the book, as an educational aid, has only been challenged in recent years. From the mid 19^{th} century, mechanical and electrical devices have been introduced into education to help in the process of raising levels of achievement, and computers are the latest devices to be seen as having relevance in the classroom.

Worldwide discussion has been initiated about the role of computers and information technology, in society and particularly in schools. The emphasis is not only on the academic capabilities of this technology, but also its social, cultural and psychological impact within the school context. Since teachers are naturally involved in the educational use of computers, studying how these groups use computers and perceive their educational role has been a main focus of study.

Training teachers to implement information technologies and integrate them into their teaching and learning, has been a focus of many studies, for at least the last two decades (Chandra, 1986, Blackmore et al., 1992, Beck, 1997).

Technology affects how teachers teach and work with the curriculum and how students learn. In order to realise fully the potential of educational technology, the issue of training teachers' needs to be addressed in a thorough and cohesive manner.

The present study aimed to investigate aspects of initial teacher training for primary school teachers in the Kingdom of Saudi Arabia (KSA), focusing on the information and communications technology training needs of Teacher Colleges' (TC) teaching staff (TS) and students, especially their experience, use and knowledge of computers, and attitudes toward them.

1.2. The nature of the problem:

Even though many studies in the last two decades have emphasised the great need for introducing information and communications technology in teacher preparation institutes, the curriculum of the TCs in Saudi Arabia (SA) does not provide such training, except for students in the science and mathematics departments, where courses in computer studies are part of the course requirements. Thus, lack of computer experience and training is a common complaint among graduates of these institutions (Al-Sadan, 1997).

With the advances made in communication and technology, Saudi students are exposed to new ideas and sophisticated technology such as video games and computers. Their expectation levels are now much higher. Therefore, the KSA needs to provide a more advanced educational system to balance life inside school with that outside. Students want to learn more, including how to benefit from the information technology that is becoming available to them in the home, and with which they may have to engage in their future careers. Therefore, teachers must achieve higher levels of education to meet and satisfy students' needs. In order to gain the students' attention, the educational system must supply the new technology and teachers capable of using it confidently and effectively.

As the computer market grew in SA and computer programs and software became more popular, even before the introduction of the Internet, teachers and students sought to be trained to use this technology and asked experts to familiarise them with it.

The introduction of computers to schools and teacher preparation institutions has been a feature of the government's development plans. In 1990 the Fifth Development plan (FDP) 1990-1995 for the KSA confirmed the importance of computers in education for all education levels. The plan stated that "To improve the quality of the educational instruction, computer education will be introduced as an integral part of the curriculum at the intermediate level, and as an awareness programme at the elementary level" (Ministry of Planning, 1990, p.306).

The FDP also stressed the importance of changes in teaching methods to utilise modern teaching aids for developing the pupils' skills. It stated that, "Not withstanding the changes introduced into the general education curriculum by the Educational Development Centre, it is imperative to adopt modern teaching methods which emphasise understanding, derivation and problem solving... Improvements will be introduced into the curriculum and in teaching methods which encourage the development of problem solving skills and creativity" (Ministry of Planning, 1990, p300). The government recognises the potential of computer technology to develop such skills, for example through the use of simulation programmes, and attaches importance to the spread of IT in schools as part of its drive to modernise education.

Despite the great importance given to this subject in SA, many researchers and educationalists claim there is a general weakness in preparing teachers for the use of media, particularly information and communications technology. Research work conducted in SA has blamed teacher training programmes and colleges for being unable to provide skilled teachers who are able to use the media hardware and software. Moshaikeh (1992) noted that in spite of the Saudi government's generous expenditure on education, the education system did not meet all the expectations for implementation of education technology, bearing in mind the rapid improvements and changes that have occurred in people's social life.

Fodah (1990) reported that the findings in her study showed that the majority of college TS she surveyed had little or no experience with computers. Therefore, she recommended the importance of introducing computers for college TS as well as for students in all levels of schools.

Al-Mohaisin (1993) reported a lack of computer training among most of the science teachers, science teacher advisors and science teacher trainers in SA, and argued that this could create serious problems with the introduction of computers into science teaching. He emphasised that unless teachers were provided with opportunities for computer training inside or outside schools, computers would not be integrated into their teaching.

Al-Amoudi (1999) noted the tremendous changes that had occurred in Saudi society, and raised the question of how the educational system will cope with these changes. One of the changes is the great need for computer literacy in employment. Employees are expected not only to know how to access the Internet, which is a universal language in this age of globalisation, but also to be able to make the most advantageous use of it. He suggested that the educational system in SA should long ago have changed to fulfil the need of today's world and the future world as well. Al-Hinai (1999) from Muscat, in Oman, responded to this article, expressing agreement and remarked that the preparation of independent individuals to live in a technology oriented world should start in the early stages. Al-Hinai noted that the Omani Educational System has realised this need and a new education reform known as "Basic Education" has been introduced, in which information technology is added as part of the curriculum from class one and Computer Studies is part of the curriculum from class five.

Similar views were expressed by Al-Maeena (1996, 1997) in two different articles calling for efforts to address anxiety about the recent technology of the Internet by preparing the society to accept these vehicles and participate in them not only as consumers, but also as information providers to put the region on the Internet. He referred to Saudi society's failure to participate in the tremendous changes in the information vehicles at the present time, the limited use of computers and the dearth of information not only in Saudi society, but in most Arab societies. Al-Maeena (1997) quoted Dr. Tash, a popular writer in SA, who has criticised the Saudi people's failure to exploit the Internet and their general lack of learning about the new technology. Dr. Al-Oraini, president of the Saudi Computer Society, as noted in Al-Maeena's article, suggested that many young men and women are capable of being active in learning about the new technology and all they need is recognition and encouragement. Al-Maeena concluded by asking: "How many schools in the Gulf area teach the use of computers"? In a follow up article, Al-Maeena (1998) noted what is going on in the developed countries. He reported the drive of the UK government to establish the National Learning Grid, which cost, as he reported, about £45 million to connect Britain's 33,000 schools, 500 colleges, 360 other educational institutions and 4,500 public libraries. He noted that an agency was proposed to offer educational support and materials related to the use of the Internet. Therefore, Al-Maeena suggests that, in Saudi society too, every child should learn about the use of computers.

Unfortunately, lack of computer experience exists in the developed countries as well. There is a widely held view among computer educators that lack of experience with computers is the cause of technophobia (Rosen, 1995). With this in mind, Rosen (1995) notes that many researchers believe that to reduce computer anxiety, teachers and student teachers need to be exposed to computer training. The USA Office of Technology Assessment (1995) reported also that for teachers to make effective use of technology in their teaching they should be literate in technology, learn how to operate the equipment, have the opportunities to discover what technologies can do for them and experience the right ways to apply them.

The learning potential of information technology, as reported by British Educational Communication Technology Agency (BECTA) in "General teacher education and IT" (1999) is far from being fully realised. The report indicated that a large number of teachers in all phases of education are not familiar with information technology and are not using it in their teaching. The Chief Executive of the British Educational Communications and Technology Agency notes that many school staff in the UK lack basic skills in information and communications technology, even though the possibility of use is increasing (BBC News, 1999a). In a speech to an audience at the British Education and Training Technology exhibition in London, he said:

> "A significant proportion of our teachers lack an appropriate capability for ICT use. We have not ensured that they themselves are capable users of ICT… it underlines the need for continuous investment in our teachers' capabilities as new technology emerges" (BBC News, 1999a, pp.1.)

Similar views were addressed, also, by the US Education Secretary, when he reported that, according to the government's National Centre for Education Statistics, about three out of four American teachers lacked confidence to work with the new technology in the classroom. These findings, as illustrated by the Education Secretary, emphasise the great need for training (BBC News, 1999b).

All of these opinions support the idea of developing the use of information and communications technology in educational systems and SA must not be left behind in this trend. A high demand for superhighway technology has been raised, especially since the Internet was introduced to Saudi society from the beginning of January 1999 (Asharg Al-Awsat newspaper, 1999) under the supervision of King Abdl-Aziz City for Science and Technology. As a result of the high demand for the use of the Internet, the information services were expanded to reach 10,000 lines by the end of July 1999. From that time on, as reported in the newspapers, every two months a further 5,000 lines will be added until this service satisfies demand. Al-Sirami (1999) mentioned that even though the Internet service had started short time ago, eleven months, and regardless of their short services, the number of the Internet users arrived to more than 160,000, most of whom were 25 years or younger. Moreover, the number of the Internet users in SA, estimated by the companies who serve in this business, to reach a quarter of million by the first quarter of the coming year, 2000 (Al-Sirami, 1999).

The educational system will not be excluded from this development; since October 1999, more than 700 schools in Riyadh Educational District have made contact with the District main office via the Email service (Riyadh newspaper, 1999). All these factors highlight the need for teachers to be computer trained so that they can include information and communications technology in the school curriculum.

1.3. The purposes of the study:

As indicated above, concern is being expressed that there are great deficiencies in the information and communications technology training programmes for TS and students at TCs in SA. The main purpose of this study is to shed light on the computer training that TS and students need to acquire, the potential of information and communications technology and their use in education in general and, specifically, in teaching. However, in order accurately to assess computer training needs, the current computer experience, computer use, and computer knowledge of the TS and students should be evaluated. Furthermore, since the attitude of learners is a fundamental key in the process of learning, the attitude of TS and students toward information and communications technology is considered as being a crucial factor for investigation.

Learning about information and communications technology depends mainly on the availability of human and physical resources. Therefore, the availability of these resources must also be considered.

The intention of this study, therefore, is to achieve the following aims:

1) To investigate the current computer experience of TCs' TS and students in SA in relation to their familiarity with types of computer, computer languages, the type of computer training they have received, and the purpose of computer use. Availability of access to computers, average number of hours spent working on computers, familiarity with computer applications, preferred computer course format and the sources of learning about computers are included in the investigation.

2) To assess the computer knowledge that TCs' TS and students in SA have in terms of understanding and basic knowledge about computer function, such as the main duty of a computer programmer, the physical parts of the computer, etc

3) To investigate the computer topics which TS and students in TCs in SA feel should be included in courses available to them.

4) To investigate the attitudes of TC teaching staff and students toward information and communications technology, in terms of their feeling about the necessity for their use, anxiety about computer use, enjoyment and satisfaction from their use, and their perceived need to use computers.

5) To identify the availability of the human and physical resources for appropriate information and communications technology training.

6) To explore and shed light on the experience of the developed and some of the developing countries in the area of training students in teacher institutes and their TS about the use of information and communications technology, in order to derive some strategies for training TS and students at TCs in SA.

7) To provide suggestions and recommendations that may enhance training and implementation in the field of information and communications technology in the future.

1.4. Significance of the study:

Whether or not computer technology should be included in teacher education is sometimes questioned in the literature. However the vast majority of literature assumes that using computer technology in education is necessary.

The influx of information and communications technology has affected the whole education system in SA, as in other countries, and this development is, in fact, felt by TCs' TS and students as part of the education system.

This study is of crucial importance to TCs in SA. As information and communications technology is growing fast and influences many aspects of life, the Teacher Colleges Committee (TCC) believes that it is very important for graduate teachers to acquire skills in this field. As a response to these demands and to fulfil this desire, the Committee in their 15th meeting, in the summer of 1997 held in Taif City, decided to add a computer literacy course to the TC curriculum. A computer literacy course was formulated and the content of the course was proposed. However, from the time this course was proposed, in September 1997 until the time of writing (December 1999) the course has not been put into action.

Lack of resources in TCs might appear as a factor delaying such action. However, the researcher believes that several problems will appear as obstacles. The most important problem is lack of empirical studies, which address topics such as the actual computer experience, computer use, and computer knowledge that TCs' students have. The students' attitude toward technology in general and particularly the use of computers as a communication tool or teaching aid has not been investigated. Moreover, no systematic study has been carried out of computer training needs in TCs and the capacity of the physical resources needed for such a course. Furthermore, the attitude of TCs' TS toward technology, in general, and their familiarity with information and communications technology, are thought to be crucially important for providing successful training for students. Adams (1998) notes that for successful computer training programmes, trainees' trainers need to be aware of the information and communications technology and able to support their students in accepting the new technology. Therefore, the computer experience, use, knowledge and attitude of TS in TCs are other aspects of which planners need to be made aware.

Some previous studies have investigated the topic of computer training needs and the need for introducing computers to TS in the KSA. However, these studies were addressed to TS in the universities (Fodah 1990), to the TS in the secondary schools (Al-Mohaisin 1993) or to special groups of students (Bukhari et al., 1992). No study has focused on TCs teaching staff and students' information and communications needs or their computer experience, computer use, computer knowledge and attitudes. Therefore, this study is unique in addressing this type of respondent and this comprehensive array of topics.

Looking at the TS attitudes, computer experience, computer use, knowledge about computers and computer training needs, will facilitate the introduction of the new technology to their students. It is commonly held that, "people teach in the same way they have been taught". Therefore, to encourage students to use information and communications technology in their teaching, some efforts should be directed also to their teachers, for as Akbaba et al. (1998) state: "Teachers' attitudes toward computers and related technologies can also influence students' attitude toward technology" (p.1).

1.5. Limitations of the study:

The study was subject to various constraints and is limited in the following ways:

1) This study is confined to the TS and students in male TCs in SA, since there are parallel educational systems in SA with two different administrations, one for males and the other for females (see Chapter 2).

2) This study is limited to TCs' populations, where teachers for primary schools are prepared and does not cover other teachers' institutions, where intermediate or secondary school teachers are prepared, such as Education Colleges.

3) This study is restricted to pre-service student teachers and their TS and does not include in-service training programmes.

4) Since the seventeen male TCs in SA serve the same purpose, follow the same curriculum, offer the same major areas of study and are managed via the same main administration, under the Ministry of Education, only five TCs were selected as a sample for the study.

1.6. Overview of the thesis:

The thesis is divided into two parts, followed by a conclusion. The first part of the thesis, containing Chapters 2, 3 and 4, presents the theoretical foundation of the work. The Saudi educational system, the development of the teacher preparation institutes and the current status of TCs are discussed in the second chapter. Literature related to information and communications technology, the development of the use of computers in education, the TS in teacher preparation institutions and students' computer use, knowledge, attitude toward computers is reviewed in Chapter 3. Computer literacy is defined and the importance of introducing computers to educators is discussed in Chapter 4. This chapter also considers the importance of some specific computer features and their uses to meet teachers' general needs in relation to information and communications technology in the teaching and learning processes.

Part two of the thesis, consisting of Chapters 5-9, presents the empirical research which was based on the foregoing theoretical foundation. The first chapter of the empirical study, Chapter 5 is concerned with the explanation of the research methodology, giving details of the plans followed in collecting data in the field. The sampling process and the development and use of two instruments, a questionnaire and interview schedules, are described fully in this chapter. Data collected about the TS's computer knowledge and experience are analysed in relation to their demographic characteristics in Chapter 6. Corresponding data about TCs' students are analysed in relation to their demographic characteristics in Chapter 7. The attitudes of the TS and the students are discussed in relation to each group's characteristics in Chapter 8. The outcomes of interviews with decision-makers and Computer course Teachers in Teachers Colleges are analysed and presented in Chapter 9.

All the findings from the two parts of the study, the theoretical and empirical, are summarised and conclusions drawn in Chapter 10, which offers recommendations on implementing computer training for TS and TC students, including a suggested module for such training. Other important topics for further research are put forward at the end of this chapter.

CHAPTER TWO

EDUCATIONAL SYSTEM IN SAUDI ARABIA

CHAPTER 2
Educational System in the Kingdom of Saudi Arabia

2.1. Introduction:

The purpose of this study is to examine the teacher college (TC) teaching staff (TS) and students' computer experience, computer use, computer knowledge, computer training need and their attitude toward computers and their utilisation. In order to see the issue in context, some background information about the country, the education system in general and the TCs system in particular will be helpful. Therefore, this chapter will provide a profile of the country, its location, religion and language, the educational authorities and the education stages. It will then explain the role of TCs in the educational system, their purposes, their population and the administrative authorities which run these establishments. The computer courses offered at present are also considered. These introductions will facilitate the understanding of the issues which will be discussed in the forthcoming chapters, especially for those readers who are not familiar with Saudi Arabia (SA) and the factors which influence its educational system.

2.2. Background about the country:

The Kingdom of Saudi Arabia (KSA) is a monarchy and an independent country located in the Southwest Asia. It occupies about 2, 250, 000 square kilometres, making it the biggest country in the Arabian Peninsula (Ministry of Planning, 1996). The official and the only language spoken by all the population is Arabic, which is the sacred language of the holy Quran and, therefore, Islam. The English language is widely spoken, but only in special places such as in banks and in foreign companies, where some employees and clients are non-Arab.

The population of the Kingdom is 16.9 millions (approx.) according to the 1991 census, of which 75% are Saudis. The remaining 25% are nationals of more than 100 countries, attracted by abundant work opportunities that have resulted from the State's adoption of a series of 5-year economic plans since 1970 (Ministry of Planning, 1996).

All Saudis are Moslems. Islam pervades all aspects of life in the Kingdom. It is distinctly reflected in the judiciary, the organisation of family relations and minute details of daily life.

Table2.1: The Administrative divisions of Saudi Arabia

The administrative divisions	Capital city
Riyadh	**Riyadh, the capital city**
Mecca	**Mecca**
Al-Madina	**Al-Madina**
The Eastern Region	**Dammam**
Al-Qaseem	**Buraidah**
Asir	**Abha**
Tabouk	**Tabouk**
Hail	**Hail**
The Northern Region	**Arar**
Jazan	**Jazan**
Najran	**Najran**
Al-Baha	**Al-Baha**

The country of Saudi Arabia consists of five main regions: the Central region "Najed", the eastern region "Al-Hasa", the southern region "Asir", the western region "Al-Hijaz" and the northern region. However, these regions are divided into thirteen administrative divisions, as seen in Table 2.1. Each of these administrative divisions has its governor (Amir), and each division has its own capital and consists of several cities, towns and villages, which exceed 6,000 (Rashid et al. 1992).

SA has witnessed rapid modernisation over the past fifty years. The project of "Bedouin settlement" was one of the most effective factors in bringing new life to this society; the building of a new education system was the other important factor. Rashid et al. (1992) suggested, also, that part of this rapid modernisation came "as a result of the several Five- year Development Plans which were scientifically and administratively designed with specific objectives in order to meet particular requirements of the economy and society" (p. 37). They added, also, "These plans played a pivotal and critical role in developing the country". However, according to Rashid et al. these plans could not have accomplished their goals without the availability of the enormous revenue from oil resources, which was wisely used and invested to bring modern technology to the Kingdom. Dewaidi (1993) emphasised that education played a big role in transforming the Saudi society from a largely illiterate nation to a modern progressive society.

2.3. <u>The education authorities in Saudi Arabia:</u>

At the present time, education in SA is run by four main authorities, namely, the Ministry of Education, the Presidency of Girls' Education, the Ministry of Higher Education, and the General Organisation of Technical Education and Vocational Training. Each of these authorities is responsible for part of the education system in general and each of them was created to fulfil special purposes. Today in SA the educational system offers free education for both males and females at all levels.

Education is segregated by gender. In other words there are parallel educational systems. The reason for this has its roots in the Islamic religion. Under Islamic law, males and females must be separated to avoid temptation or sin. Therefore, all students are educated separately. Boys are educated under the direction of the Ministry of Education (ME) and girls educated under the direction of the General Presidency for Girls' Education (GPGE). They attend separate schools with different curricula and are taught by teachers of the same gender. At the tertiary level, females can attend those universities which accept female students and can apply to the education colleges run by the General Secretariat for Girls Colleges (GSGC), which is subject to the control of the General Presidency for Girls' Education. At the girls' education colleges all teachers are females, but in the universities, girl students may be taught through closed circuit TV by male instructors when female instructors are not available, or by female instructors face to face.

2.3.1. <u>Ministry of Education:</u>

Before the establishment of the Ministry of Education in 1953, the education system in the country was run under the supervision of the Directorate General of Education. However, the educational directorate was not able to cope with the demands for expansion of education in each part of the country. Hence, the creating of a new Ministry of Education was made part of the reorganisation of government in 1953 (Rashid et al. 1992).

The Ministry of Education is responsible for planning and supervising male students' general education, providing supervision and technical education for teachers and overseeing Adult Education for males, Special Education, Technical and Vocational

Education. The last two directorates, Vocational and Technical Education, were drawn up in the year of 1980 as a basis for establishing the General Directorate for Technical and Vocational Education.

The Ministry of Education faced several problems in the beginning, such as an inadequate curriculum, shortages of school buildings, lack of teacher preparation institutions, and deficiency of qualified teachers, beside the increasing demands for schools to be opened in all the provinces in the country (Al-Hackle, 1994). However, the education indicators show a remarkable growth, by all standards, as a result of the free education made available to all citizens. Before the establishing of the Ministry of Education, the number of male students in 1950 was estimated as 27, 133 studying in 222 schools, most of them primary schools (Al-Bunyan, 1992). General education enrolment increased remarkably to reach about two million male students by 1996-1997, studying in about 9,800 schools in different cities, towns and villages, as shown in the last report of the Data Centre in the Ministry of Education (1996-1997).

2.3.2. General Presidency for Girls' Education:

The second largest administration supervising education in SA is the General Presidency for Girls' Education, which was established in 1960 to supervise girls' education in the country. The General Presidency of Girls' Education provides primary, intermediate and secondary education for girls, controls kindergartens and colleges of education for girls and supervises primary teacher training programmes for girls.

The establishment of the Presidency, as Al-Zaid (1982) reported, was the real start of formal girls' education. Before that time, girls' education was not available in the country, except for a few small private institutions in a few cities. Furthermore, the idea of girls' education met with strong opposition in some areas of the Kingdom. However, this opposition has changed, now, to keen support everywhere. Therefore, the number of primary schools for girls increased from 378 in 1970 to 1655 in 1980 and the number of students increased from 119,789 in 1970 to 325,369 in 1980 (Ministry of Education, 1982). By 1995, the number of schools had reached 5164, and the number of girl students in the same year exceeded a million (Ministry of Education, 1996).

2.3.3. Ministry of Higher Education:

The third educational authority is the Ministry of Higher Education, which was established in 1975 to supervise the execution of the Kingdom's policy in the field of higher education and presently supervises the seven universities in the kingdom. As Rashid et al. (1992) reported, "The Ministry of Higher Education oversees policies in about 82 colleges and institutes of higher learning in SA and it was allocated 31% of the budget for the 1980-1985 plan for higher education (2.5 billion dollars)" (p. 50).

Higher education was established in SA to provide the country with qualified manpower to reduce the country's dependence on non-Saudi educators. As expressed in the third Development Plan (covering 1980-1985):

> "The development of Saudi human resources stands at the heart of the development process. The national development plan aims at the formulation of

policies necessary for the development of their human assists. To achieve this, the Kingdom's education and training systems, together with the labour affairs programmes, play a central role as the flexible institutional structure that can adapt to the exigencies of rapid change and modernisation". (Ministry of Planning, 1980, P.287)

The plan continues by stating that, as a whole, the objectives of education and training are to expand coverage to provide equal access to at least basic education for all citizens while improving educational quality.

2.3.4. General Organisation of Technical Education and Vocational Training:

The responsibility for developing vocational and technical training programmes is assigned to the General Organisation of Technical Education and Vocational Training (GOTEVT), which was established in 1980. The main objectives of this establishment are to develop technical education and vocational training and to execute programmes for the training of national manpower according to the policies laid down by the Manpower Council for Training and for Technical Education covering industry, agriculture and commerce (Al-Sonbol et al. 1996). Before the establishment of the GOTEVT, vocational training centres were under the supervision of the Ministry of Labour and Social Affairs and technical education institutes were under the supervision of the Ministry of Education. However, with the establishment of the new organisation, vocational training and technical education were integrated under its supervision. The GOTEVT has four main branches, one in the eastern region to serve the Eastern and the Northern districts, the second located in the western region, the third located in the southern region and the fourth branch located in the central region (Al-Sonbol et al. 1996).

2.4. Educational structure and the main stages:

One of the main considerations taken into account by the educational system in SA is the physical and psychological characteristic of students in the different stages of their growth (Ministry of Education, 1996). Therefore, the system offers its services through an educational ladder that allows transition from one stage to another in a natural progression. The objectives of each educational stage were defined carefully and the duration and the nature of study for each stage were clearly set.

General education consists of three main stages, the primary level, the intermediate level and the secondary level. Pre- schools, or Kindergarten schools, are available but are not included in the ladder, since entrants to primary school are not required to have attended kindergarten.

2.4.1. The first stage (Primary school):

The primary school is the base of the educational pyramid and children are entitled to join these schools at six years old. All primary schools are day schools, and the plan of study emphasises religion and Arabic language, with some considerations of general culture and science. Until last year, students had to pass two semester examinations each year to be promoted from one grade to another. However, this rule was changed in the school year of 1997-98, especially for the first three levels of the primary school, where students progress from level to level according to the teacher's estimation. Students who pass the sixth grade examination are qualified to study in the intermediate level. This stage has witnessed a rapid increase in the number of students, schools, classes and teachers.

Table 2.2: Quantitative development of primary stage within the last five years

School Year	Schools		Classes		Students		Teachers	
	Total	**Female**	**Total**	**Female**	**Total**	**Female**	**Total**	**Female**
1990-91	9097	3930	84516	36996	1876916	857208	119881	56990
1991-92	9490	4194	88344	39013	1922054	893076	127420	61452
1992-93	10230	4674	95128	43205	2025881	950998	138434	67408
1993-94	10711	5014	99960	45380	2114736	997081	149903	74511
1994-95	10871	5164	103687	47306	2168637	1033090	160932	80734

* *Ministry of Education, (1996).*

Table 2.2 shows the regular increase in this stage throughout the past five years, not only in the number of students, but also in the number of schools, classes and in teachers for both boys and girls.

2.4.2. <u>The second stage (Intermediate School):</u>

When students finish the primary school and have passed the sixth grade examination, usually at the age of twelve, they join this stage for a minimum of three years. In this stage students usually have the opportunity to expand their knowledge and they study different subjects, such as Islamic Studies, Arabic Language, Social Studies, Mathematics, Science and English as a second language. The school year is divided into two semesters and students must pass examinations in all subjects, every semester.

Table 2.3 Quantitative development of intermediate stage within the last five years

School Year	Schools		Classes		Students		Teachers	
	Total	**Female**	**Total**	**Female**	**Total**	**Female**	**Total**	**Female**
1990-91	3289	1194	21342	8577	570080	247257	43130	18285
1991-92	3582	1358	23359	9492	616560	269362	47416	20456
1992-93	4009	1600	25978	10750	693198	303170	52793	23266
1993-94	4431	1822	28954	12113	770839	336766	59529	27578
1994-95	4598	1955	31361	13246	833648	371557	65277	30112

**The Ministry of Education, (1996).*

The number of schools, classes, students and teachers in the intermediate stage has grown rapidly over the last five years, as seen in Table 2.3.

2.4.3. The third stage (Secondary School):

The end of general education is the third stage, which is the secondary school, where students spend three years after graduating from the intermediate school. There are different types of secondary school: the general secondary school, which most students enter, religious oriented secondary schools such as the Quranic and the Ilmi Institutes for boys, and secondary schools for training teachers for primary school (only for girls). In the first year of the general secondary school, students study similar subjects to those available in the Intermediate level of school, but in greater depth. In the second and third years of the secondary school (equivalent to years 10 and 11 in the UK educational system) students have the choice between Science or Arts studies. In the Arts section, the curriculum concentrates on Arts subjects, while students in the Science section study subjects related to science, such as physics, chemistry, biology and mathematics, plus the Islamic and Arabic curriculum. Computer Studies are also part of the secondary school curriculum for students in both the Science and Arts divisions.

Table 2.4: Quantitative development of secondary stage within the last five years

School Year	Schools		Classes		Students		Teachers	
	Total	**Female**	**Total**	**Female**	**Total**	**Female**	**Total**	**Female**
1990-91	1354	581	11019	4673	289562	132586	20018	9884
1991-92	1537	685	11967	5255	313576	143772	22127	11238
1992-93	1732	795	12979	5839	340486	151949	24599	12887
1993-94	1915	875	14280	6625	385753	173615	27937	15266
1994-95	2002	948	15764	7375	434898	202016	31568	16970

**The Ministry of Education, (1996).*

2.4.4. Technical education and vocational training:

Technical and vocational education has received great attention in SA. The main purpose of this type of education is to execute programmes for training the national manpower according to the policies laid down by Manpower Council for Training and Technical Education in the fields of industry, agricultur and commerce (Ministry of Education, 1996). By 1995 there were six Junior Colleges for Technology comprising 7,214 students, nine Industrial Secondary Institutes involving 8,559 students, thirty-two day and night Commercial Secondary Institutes, in which about 10,095 students were registered and three Agricultural Secondary Institutes with 737 students. Besides these types of training school, other types of training schools are available and run under the supervision of other organisations. The Ministry of Telecommunication directs the Telecommunication Institute and Post and the Telegram Institute, while Health Institutes (separate for men and women) are directed by the Ministry of Health (Ministry of Education, 1996). The General Presidency of Girls' Education also directs several technical centres for female students; there were 32 such centres in 1998 (General Presidency of Girls' Education, 1999).

Table 2.5: Quantitative development of technical education within the last five years

School Year	Schools		Classes		Students		Teachers	
	Total	Female	Total	Female	Total	Female	Total	Female
1990-91	87	20	1188	115	27180	2734	3083	321
1991-92	96	24	1043	114	28000	2380	3321	380
1992-93	105	25	1227	106	31532	2012	4124	358
1993-94	107	27	1353	111	35249	1942	4204	405
1994-95	117	32	1360	111	35812	2326	4886	491

**The Ministry of Education, (1996).*

Table 2.5 shows the quantitative growth of the institutes, classes, students and the teaching staff in technical education under the supervision of the General Organisation of Technical Education and Vocational Training during the last five years.

2.4.5. Adult Education:

One of the main problems the educational authorities in SA faced in the last three decades was illiteracy. With their commitment to making education available to all residents regardless of age and gender, the education authorities in SA organised several programmes to eradicate illiteracy for those who missed learning in the early stages of their life. Special programmes were set up for these learners, through many centres. In these centres the duration of study for the elementary level is reduced to three years. Some of these programmes are run as summer campaigns to combat illiteracy in the remote areas, which are far from schools (Al-Sonbol et al. 1996). Evening schools for adult education have been opened especially for males who wish to pass the examination of the intermediate or secondary level of study and to get the same Certificate as that awarded in the formal schools. Special evening schools have been opened for female students who missed learning in childhood and wish to qualify themselves for advanced learning. The

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Table 2.7: Quantitative development of adult education within the last five years

School Year	Schools		Classes		Students	
	Total	**Female**	**Total**	**Female**	**Total**	**Female**
1990-91	2260	1014	7034	4040	103111	50146
1991-92	2355	1067	7301	4242	112340	55009
1992-93	2530	1264	7602	4909	117336	65665
1993-94	2663	1375	8130	5459	114414	64215
1994-95	2709	1451	8498	5919	116515	71111

**The Ministry of Education, (1996).*

2.4.6. Special Education:

Mentally handicapped, deaf and blind citizens in SA also have the opportunity to learn through special schools organised for them. The objective of this type of education, as illustrated by the Special Education Administration in the Ministry of Education is "To make them (handicapped, blind and deaf citizens) productive and self-reliant members of the society through education and training suited to their special circumstances, so that they are better able to participate in the social life and attain better standards of living consistent with their capability" (Al-Sonbol et al., 1996, p. 393). To achieve this objective, special education goes in parallel with the education ladder of general education and educational services are provided for students who have learning disability, or visual or hearing impairment. Two separate programmes are run; one for boys under the supervision of the Ministry of Education and the other for girls directed by the General Presidency for Girls' Education. The General Organisation of Technical and Vocational Training also provides some vocational training and rehabilitation for those mature citizens with special needs. Handicapped students who have no intellectual problems, especially those with visual problems, follow the normal stages of learning, primary, intermediate and secondary, in special schools equipped with the facilities needed. When students graduate from secondary school they are awarded a certificate equivalent to that given to non-handicapped students and they have the right to continue their education according to their capacities. Students with physical handicap have the opportunity to enrol with other students in the same schools. For deaf students, special schools are available in which Arabic sign language is used. Students with learning disability have special primary and intermediate schools and after that special vocational training programmes are organised for them. This type of education is supervised by a special administration called the General Administration for Special Education, directed by the Ministry of Education and these types of schools are available only in the main cities in the country.

Table 2.8: The growth of special education between 1984-1985 and 1995-1996

Type of education		1984-85		1995-1996	
		Total	**Female**	**Total**	**Female**
Al-Nour for the Blind	**Institutes**	**11**	**3**	**11**	**3**
	Students	**377**	**88**	**760**	**224**
	Teaching staff	**381**	**46**	**274**	**91**
Al-Amal for the Deaf	**Institutes**	**10**	**4**	**32**	**9**
	Students	**1374**	**505**	**3685**	**1393**
	Teaching staff	**295**	**128**	**801**	**278**
Intellectual Education	**Institutes**	**7**	**3**	**23**	**6**
	Students	**813**	**276**	**3356**	**983**
	Teaching staff	**183**	**82**	**637**	**208**

*The Ministry of Education, (1996).

It can be seen from the table above that there has been an over-all increase in student enrolment, number of schools and teachers for special education over the period of time. It can also be seen that the number of schools for deaf and retarded students more than trebled, the number of students doubled or trebled and the number of teachers expanded to about three times what it was in 1984-1985. However, although the number of students in the blind institutes doubled, the number of institutes is the same, and moreover, the number of teachers decreased between 1984-85 and 1995-96 by more than a hundred. Al-Salloom (1995) noted the decrease in number of teachers in the Blind Institutes, but he did not give any reason for it.

2.4.7. Private Education:

Private education in SA is also available to support the government's effort to offer education to the whole nation. Private schools are available in the three levels of study, primary, intermediate and secondary stages and the private sector is the main provider of kindergarten education. Even though private schools are managed and directed by private establishments, the main educational authorities, Ministry of Education and the General Presidency of Girls' Education have the right to supervise these schools technically and administratively.

The General Department for Private Education in the Ministry of Education was appointed to carry on the responsibility of supervising this type of education financially, technically and administratively. The number of private schools has increased tremendously during the past thirty years, especially in the Kindergarten schools where there were only 45 schools in 1970, increased to 169 in 1980 and reached about 553 in 1995, as seen in Table 2.9.

Table 2.9: The development of kindergarten from 1970 to 1995

School Year	Kindergarten	Children	Teachers
1969-70*	45	4169	66
1974-75*	91	14123	402
1979-80*	169	24448	903
1990-91**	432	52815	3364
1991-92**	481	57508	3534
1992-93**	507	63488	3885
1993-94**	536	66432	3959
1994-95**	553	63528	4185

**Ministry of Education (1982) **The Ministry of Education (1996).*

2.4.8. Higher Education:

Much attention is given to higher education in SA, since this type of education is the main source for preparing the manpower for the country (Rashid et al. 1992). Higher education is now available to each student who graduates from high school, in a multitude of fields: Islamic Studies, Humanities and Social Science, Administration, Education, Natural Sciences, Engineering, Medicine, Agriculture and others (Ministry of Education, 1996). There are seven universities spread over sixteen campuses located in different places all over the country, under the auspices of the Ministry of Higher Education. Some of these universities have branches in different locations and are also organised to serve male and female students through two parallel campuses.

Table 2.10: The universities in Saudi Arabia, their locations, branches and the type of students served

The University	Establishment	Main Location	Branches	Students Served
King Saud	1957	Riyadh	Al-Qassim	Male & Female
Islamic University	1961	Al-Madinah	None	Male only
King Fahad	1963	Al-Dahran	None	Male only
King Abdul-Aziz	1967	Jeddah	Al-Madinah	Male and Female
Imam Mohed Bin Saud	1974	Riyadh	Al-Qassim & Al-Hasa	Male & Female
King Faisal	1975	Al-Hasa	Al-Dammam	Male & Female
Umm Al-Quora	1981	Mecca	Taif	Male & Female

**Source: Ministry of Higher Education, 1998.*

Table 2.10 shows the establishment of each of these universities, the location of the main campus, the branches, and the type of students served in these campuses.

Table 2.11: Summary of the higher education establishments in Saudi Arabia with gender, no of colleges, no of students and no of teaching staff in the first semester of 1997

The University	Gender	No of Colleges	No of Students		No of Teaching staff
			Underg.	Post G.	
King Saud Univ.	Male	18	32169	1362	2170
	Female		14933	691	592
	Total		47103	2053	2762
Islamic Univ.	Male	5	3297	233	351
	Female		0	0	0
	Total		3297	233	351
King Fahad Univ.	Male	8	7049	533	809
	Female		0	0	0
	Total		7049	533	809
King Abdulaziz Univ.	Male	10	18398	652	1278
	Female		17684	370	622
	Total		36082	1022	1900
Imam Mohammed Ibn Saud Univ.	Male	13	29287	901	1573
	Female		3777	205	622
	Total		33064	1106	2195
King Faisal Univ.	Male	6	5329	289	624
	Female		4294	97	151
	Total		9633	386	775
Umm Al-Qura Univ.	Male	9	11134	1156	931
	Female		8527	416	242
	Total		19661	1572	1173
Girls' Education Colleges	Male		0	0	8
	Female	49	87746	556	3339
	Total		87746	556	3347
Health Colleges	Male	13	1906	0	503
	Female		744	0	161
	Total		2650	0	664
Educational Technology	Male	9	7214	0	1207
	Female		0	0	0
	Total		7214	0	1207
Teacher Colleges	Male	18	18621	0	1565
	Female		0	0	0
	Total		18621	0	2772
Total	Male		134404	5126	6411
	Female		137705	2335	7294
Total		158	272109	7461	17955

* *Ministry of Higher Education (1998).*

Table 2.11 shows the actual number of colleges, students, teaching staff in each university in SA. The increasing number of students enrolled in the universities reflects the high demand for higher education in the last two or three years. It will be noticed from the table that certain of these institutes do not enrol women: the Islamic University, which trains religious scholars and King Fahad University, which specialises in Petrochemicals and related fields, are not open to women, nor are the few specialist Educational Technology institutes. Teacher Colleges train only male teachers, women being provided for separately in their own Education Colleges. Even in those institutes which do accept women, however, female students are heavily outnumbered by males. There are several reasons for this: the fact that the universities opened their doors to women only recently; shortages of female teachers; ineligibility of women for some fields of study, and the different values attached by society to male and female education. Male instructors may teach girl students through closed circuit TV when female instructors are not available. For all these reasons, there are more male instructors than female (see Table 2.11).

2.5. Teacher Training:

A great emphasis is placed on teacher training programmes by the three education authorities in SA, the Ministry of Education, the General Presidency of Girls' Education and the Ministry of Higher Education. The Ministry of Education has managed and developed various teacher-training programmes during the last six decades. The first two colleges, the College of Shari'a and Islamic Studies and the College of Education, were founded in Makkah, in 1949 and 1951 respectively, under the supervision of the Ministry of Education to prepare teachers for intermediate and secondary schools (Al-Sonbol et al. 1996).

At the current time, almost all the schools, which aim to prepare teachers for intermediate and secondary schools, are under the supervision of higher education organisations, except for several education colleges for girls only, directed by the General Presidency for Girls' Education. The establishments for preparing primary school teachers, throughout their development from intermediate institutes to TCs, have been run under the supervision of the Ministry of Education for males and that of the General Presidency of Girls' Education in the case of girls' institutions.

2.5.1. The preparation of intermediate and secondary school teachers:

The universities in the KSA prepare intermediate and secondary stage teachers in parallel systems, one for male and the other for female students.

All universities in the Kingdom have among their objectives the preparation of qualified educators capable of teaching in the intermediate and secondary schools via the College of Education or through other colleges. Besides the general education, psychology, educational technology, curriculum and teaching methods departments, which are organised to provide students with good vocational preparation, there are other departments that enable students to specialise in some field of learning. The College of Education in King Saudi University, for instance, offers preparation in various areas of studies, such as Islamic Studies, Physical Education, Arabic Language, Education Art, Special Education, Linguistics, History, Geography, Physics, Mathematics, Chemistry and

Biology. In 1996, some of these areas of study were transferred to other colleges, for example Arabic Language, Linguistics, Geography and History to the Art College and Chemistry, Biology, Physics and Mathematics to the College of Science (Al-Sonbol et al. 1996). Therefore, a student wishing to be a teacher must spend seven semesters studying an academic specialism in the appropriate college. He then spends three semesters on the vocational preparation programme, studying some courses in general education, psychology, curriculum teaching methods and educational technology. This is followed by a full semester for practising teaching in the appropriate level of school, intermediate or secondary. The numbers of students registering in the six Colleges of Education across the country belonging to four universities and those who have graduated are growing rapidly. The number of registering students, males and females, grew from 10,012 students in 1985 to 24,583 students in 1995, and the number of graduated students developed from 840 students to 3,548 students in the same period of time.

There are also other colleges that participate in preparing teachers for intermediate and secondary schools in all the seven universities available across the country, such as Art Colleges, Science Colleges and Arabic Language Colleges. Moreover, the Colleges of Education, which run under the supervision of the General Presidency for Girls' Education, also provide teachers for intermediate and secondary girls' school in different areas of study.

2.5.2. The preparation of primary school teachers:

Ever since the establishment of the Ministry of Education and the encouragement and spread of education throughout the country, demand has risen for primary schools. Therefore, the Ministry of Education faced a critical shortage of teachers for these schools. A fast plan was set up to meet these demands by contracting teachers from neighbouring Arabic speaking countries, Jordan, Iraq, Egypt and Sudan (Al-Gamdi, 1987) and a fast track programme for preparing national teachers was organised. There had been a few attempts at preparing teachers for primary schools before the establishment of the Ministry of Education in 1953, but the first systematic planning of such efforts was initiated by the Ministry of Education (Al-Sonbol et al. 1996).

The preparation of primary school teachers for male and female has gone through numerous changes, which might be presented in four stages as follows:

- The Intermediate Teacher Institutes from 1953-1965,
- The Secondary Teacher Institutes from 1965-1976,
- The Junior Colleges, from 1976-1988,
- Teacher Colleges from 1989 until now.

2.5.2.1. The first stage: Intermediate Teacher Institutes:

One of the main policies cited by the Ministry of Education at the time of its establishment was organising special schools for preparing teachers for the primary schools (Ministry of Education, 1982). The first type of school established to fulfil this purpose was the Intermediate Institute for preparing teachers for primary schools. Applicants to these schools had to have the elementary certificate, and to meet other requirements such as being aged between 15 and 20 years old, capable to practise teaching and free from any disability. To encourage and attract students to enrol in these types of school, the school paid every student a monthly allowance of between 60 and 150 Saudi Riyals. Graduate students were qualified to be appointed as primary school teachers.

Since the aim of these institutes was to prepare teachers for the primary schools for the whole country, this type of programme started with three institutes with only 70 students in 1953, but the quantitative expansion reached 37 institutes with about 4,395 students by 1961 (Mosa, 1994). After the establishment of these institutes, a curriculum was organised based on the intermediate school curriculum with some modifications. The basic modification in the study plan was adding foundation courses in education and psychological concepts instead of foreign language studies. Teaching practice was added as part of the requirement in the second and third years of the study. Students were required in the second year to visit primary schools for one week and to attend classes for teaching for another week. Third year students were required to teach in primary schools for two weeks (Al-Sonbol et al. 1996).

Regardless of the rapid expansion of this type of institute and the several changes made to the curriculum, the Ministry of Education recognised that the quality of these programmes was not high enough, but this was for a time the only available option to meet the high demand for primary school teachers.

The increase in the number of students continued, to reach 7,556 students by the year of 1964, while the number of institutes decreased to 30 institutes in the same year due to the decision to close these schools and upgrade the training programmes from intermediate to secondary level (Ministry of Education, 1979).

2.5.2.2. <u>The second stage: Secondary Teacher Institutes, 1961-1976:</u>

Because of the insufficient teaching skills and the deficient general education and subject matter knowledge of the teachers who graduated from the intermediate institutes, the Ministry of Education decided to stop this type of programme and replace them with higher level programmes. The new programmes were equivalent to the secondary stage in terms of duration and requirements. For candidates to enrol in these programmes they had to have the intermediate certificate. The objective of these institutes was to provide primary schools with more mature teachers qualified with the necessary professional knowledge and skills.

This programme of teacher preparation started in 1965 with seven institutes distributed in seven different cities around the Kingdom and by 1976 the number of institutes had reached 18 (Ministry of Education, 1982).

The curriculum for these institutes was based mainly on the secondary school curriculum with the addition of teaching skill courses. The study plan used to contain thirty-eight hours weekly for each of the three levels of study, focusing on general preparation, educational studies and practical teaching (Mosa, 1994).

2.5.2.3. The Upgrading Study Centres

To upgrade and improve the quality of those students who had graduated from the intermediate institutes and were serving as teachers in the primary schools, two teacher up-grading centres were established. One of these centres was in the capital city of Riyadh, in the centre of the country, to serve the East, Centre and part of the North region and the other one was in Taif city to serve the West, South and part of the North of the Kingdom.

Trainees in these centres were exposed to an intensive course for two years, equivalent to the secondary institute level courses, to increase their knowledge (Ministry of Education, 1979). However, these schools were abolished in 1980, by which time almost all working teachers with certificates from the intermediate institutes level had been trained and upgraded to the secondary institute level (The Ministry of Education 1982).

Even though the study plan of the secondary institutes was subjected to various improvements and the Upgrading Centres raised the quality of those teachers who graduated from the intermediate level institutes, the quality of preparation was still inadequate. Therefore, once the demand for indigenous teachers was met, post- secondary programmes for preparing teachers for primary schools were introduced in 1976.

2.5.2.4. The third stage: Junior College, 1976-1988:

To meet the high demands for better primary school teachers, the preparation programme underwent a third stage of change. In this stage, the secondary teacher training institutes were abolished and replaced with post secondary programmes. However, because of the shortage of students from the secondary schools and the continued demand for primary school teachers in the 1970s, the Ministry of Education introduced only Junior Colleges, instead of introducing the Bachelor degree colleges, which were in the plan (Mosa, 1994).

The Junior Colleges were first introduced in 1976 in two cities, Riyadh and Makkah, starting with enrolment of 326 students and by the year of 1979-80 the number of colleges reached 7, with about 3,463 students. These types of schools were organised to serve two main aims. The first aim was to upgrade the level of preparation of in-service teachers who had graduated from the secondary institutes and from the upgrading centres. The second purpose was to prepare new teachers from those students who had graduated from secondary schools. The latter category comprised only about 15% of the new admissions (Ministry of Education, 1982).

The study in Junior College used to follow the semester system, where students were required to study for five to six semesters, each of seventeen weeks. The curriculum focused on three aspects of preparation: general requirements, where students studied general subjects, such as Islamic studies, Mathematics, Science, Social Studies, Language; educational requirements and specialist preparation, where students had the opportunity to specialise in two areas of study (one major and one minor) chosen from: Religious Studies, Arabic Language, Social Studies, Art Education, Physical Education, Science and Mathematics.

Junior Colleges played a big role in preparing and upgrading primary school teachers from the time of establishing the first two colleges in 1975-76 to 1988. The number of junior colleges reached 17, scattered around the country (Al-Sonbol et al. 1996). However, in 1987-1988, a decision of the Committee for Educational Policy was issued to upgrade the level of primary school teachers to at least Bachelor degree. As a result, all Junior Colleges were replaced with the new colleges called Teacher Colleges (TC) (Ministry of Education, 1994).

2.5.2.5. The fourth stage: Teacher Colleges:

The new regulations provide that the minimum educational qualification for primary school teachers should be a Bachelor's degree, to be consistent with the aim of the educational policy in the KSA, which provides that "the educational authorities should concentrate on the training of teachers to be academically and morally qualified in order to achieve self-sufficiency in stages of education according to a set time-table" (Ministry of Education, 1994, p. 51). Therefore, for the purpose of improving the quality of primary school teacher preparation, TCs were established to meet the aspiration of the policy makers in the Ministry of Education and those in-service teachers who are interested to upgrade their level of qualification. The seventeen Junior colleges listed in Table 2.12 were upgraded to a Four-year College system.

Table 2.12: The Teacher College Locations and years of establishment

NO	Teacher College Location	Y. of Opening	No	Teacher College Location	Y. of Opening
1	**Riyadh TC**	**1976-1977**	**10**	**Hail TC**	**1983-1984**
2	**Makkah TC**	**1976-1977**	**11**	**Ahsa TC**	**1983-1984**
3	**Madinah TC**	**1977-1978**	**12**	**Bisha TC**	**1986-1987**
4	**Abha TC**	**1977-1978**	**13**	**Tabouk TC**	**1986-1987**
5	**Dammam TC**	**1977-1978**	**14**	**Konfodah TC**	**1986-1987**
6	**Rass TC**	**1977-1978**	**15**	**Jeddah TC**	**1988-1989**
7	**Taif TC**	**1978-1979**	**16**	**Arar TC**	**1988-1989**
8	**Jauf TC**	**1981-1982**	**17**	**Baha TC**	**1988-1989**
9	**Jazan TC**	**1981-1982**			

**Source: Ministry of Education (1994)*

2.5.2.5.1. The Purpose of Teacher Colleges:

According to the Students' Guidance, published by the department of Deputy Minister for Teacher Colleges in the Ministry of Education, several aims were defined for Teacher Colleges, such as:

* Preparing academically and educationally qualified teachers for the primary stage according to the Islamic values;

* Upgrading the proficiency of in-service teachers and improving their educational knowledge and preparation;

* Participating with the responsible agencies in practical studies related to the primary school curriculum and school problems;

* Co-operating with the agencies responsible in teacher training preparing and organising training programmes not only for teachers, but also for principals and for those who work in the teaching field in all educational stages;

* Co-operating with the district educational authorities in solving the educational problems identified by empirical research;

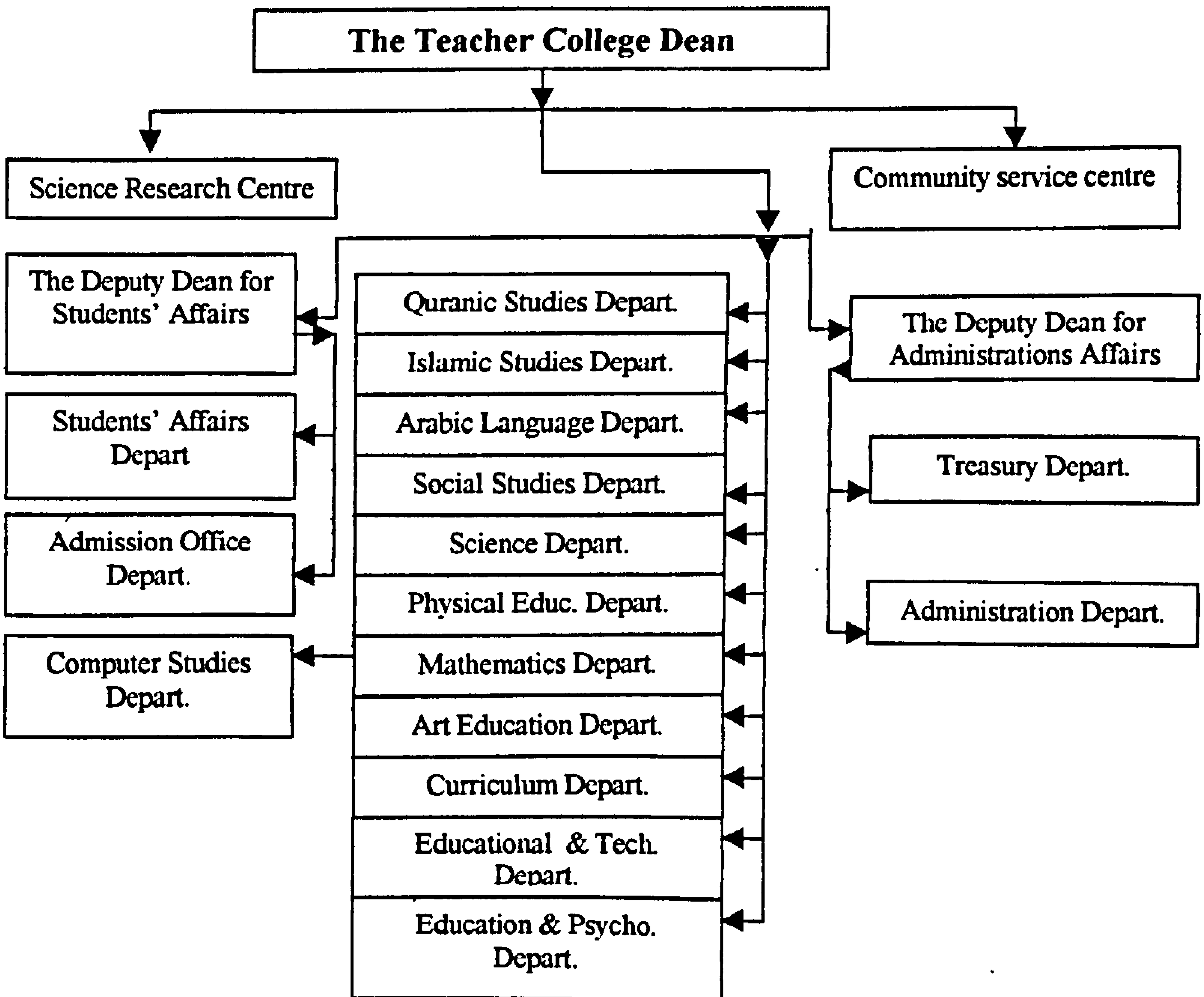
* Collaborating with educational establishments inside and outside the kingdom in solving educational problems and participating in scientific research, educational circulars and seminars to exchange experience and knowledge (Ministry of Education, 1998a).

2.5.2.5.2. The Teacher College Administration:

Three bodies, each of which has special duties, govern the TCs in SA. The highest body is the "Teacher College Deans Committee", headed by the Minister of the Ministry of Education and the Deputy Minister for Teacher College is the Vice-President. This body consists of all the TCs' Deans, plus the Physical Education Junior College Dean, the Students' Affairs Dean and the Science Research Dean in the Teacher College Administration. The second body is the Teacher Colleges Administration in the Ministry of Education, which is headed by the Deputy Minister for Teacher Colleges. This body consists of several administrations, each with its own area of responsibility. This administration is responsible for implementing decisions of the TC Deans' Committee and following them up; providing Teacher Colleges with necessary teaching staff and funding, and setting rules for dealing with students' affairs, teaching staff unions etc.

The third body administers each TC separately and that is the "Teacher College Board", which consists of the Teacher College Dean as president and the heads of departments, plus the director of the relevant district education authority. Figure 2.1 shows the organisational system for TCs. The College Dean comes at the head of the system, and two deputies share the responsibility of administering the system, one for the administration affairs and the other for the students' affairs. Eleven academic departments are available in each TC, four main administration departments and two centres. The academic departments and the two centres are related directly to the college dean, as seen in Figure 2.1. Computer Studies departments are available only in three TCs, Riyadh, Dammam and Jeddah and its under the supervision of Mathematics Departments so far.

Figure 2.1: The Teacher College Organisational System



Source: The Ministry of Education (1998, b)

2.5.2.5.3. The Study System:

The study in TCs consists of four years. Each year is divided into two levels and the duration of each level is a full semester. Students are upgraded from one level to another according to attendance and achievement. The minimum time for studying in the college is four years, eight semesters, and the maximum is six years. For the student to graduate with a Bachelor's degree in primary teaching, he must pass all the required subjects with a grade average of at least 2 on a scale from 0-5.

The study plan consists of three parts: the general requirements, the educational requirements and the specialisation requirements as seen in Table 2.13. Various academic departments are available in each college, namely: Quranic Studies, Islamic Studies, Arabic Languages and Literature, Social Studies, Physical Education, Art Education, Mathematics, Science, Education and Psychology, Curriculum, Educational Technology, and Computer Studies only in Riyadh, Dammam and Jeddah TCs.

Table 2.13: Teacher College course requirements and the number of units

Type of Requirements	Type of courses	Number of Units
General Requirements	**Quranic Courses**	**13**
	Islamic Courses	**10**
	Arabic language Courses	**11**
	Social Study Courses	**4**
	Mathematics Courses	**12**
	Science Courses	**13**
	Physical Courses	**5**
	Art Courses	**4**
	Foreign language Courses	**2**
Educational requirements	**General education Courses**	**13**
	Psychology and Counselling courses	**9**
	Curriculum Courses	**8**
	Educational Technology Courses	**7**
	Practical Teaching	**8 (One Semester)**

Continued: Table 2.13: Teacher College course requirements and the number of units

Type of Requirements	Type of courses	Number of Units
Specialisation requirements	**Quranic Studies**	**40**
	Islamic Studies	**40**
	Arabic Studies	**40**
	Social Studies	**40**
	Physical Education Studies	**40**
	Art Studies	**40**
	Mathematics Studies	**40**
	Science Studies	**42**
	Computer Studies	**40**

**The Ministry of Education (1998b)*

Students have the opportunity to specialise in one of the nine departments mentioned above according to their interest and the need for teachers in each specialisation. Usually, the number of candidates for each TC is defined by the Teachers' Affairs Administration in the Ministry of Education. Table 2.14, for instance, shows the number of candidate students for the academic year of 1998-1999 for all TCs in all departments of study.

Table 2.14: The number of candidate students for the year of 1998-1999 for all Teacher Colleges

Teacher College	Quranic	Islamic	Arabic	Social	Math	Science	Art	Physical Educ	Computer Studies
Riyadh TC	35	0	160	30	100	40	40	0	50
Makkah TC	35	0	100	30	70	25	20	0	0
Taif TC	35	0	100	0	70	25	20	20	0
Dammam TC	35	35	35	30	35	40	20	20	50
Al-Rass TC	35	0	70	0	70	50	20	20	0
Al-Madinah TC	35	0	70	30	35	25	20	0	0
Abha TC	35	0	70	0	70	70	20	20	0
Jazan TC	35	0	100	0	70	50	20	20	0
Al-Jouf TC	70	0	70	30	70	50	20	0	0
Hail TC	35	0	100	30	70	70	20	0	0
Al-Hasa TC	90	0	100	0	70	70	20	20	0
Bishah TC	70	0	70	0	70	50	20	0	0
Tabouk TC	70	0	70	35	35	40	20	20	0
Al-Konfodah TC	35	0	70	30	70	40	20	0	0
Jeddah TC	35	0	100	0	70	50	20	0	50
Arar TC	70	0	90	0	70	40	20	20	0
Baha TC	35	0	70	0	70	50	20	0	0

From the Table above it can be noticed that the number of candidate students for study in each college varies from college to college and between departments within a college. The number of administers to TC is usually planned by the Department of Teacher Affairs in the Ministry of Education, according to the actual District Administrations' need for teachers (Al-Sonbol et al. 1996).

2.5.2.5.4. Computer course and Teacher College curriculum:

The importance of computer study for college students was realised by the TS in the mathematics departments in TCs. Therefore, this topic was discussed in a special meeting for heads of mathematics departments in TCs in 1991. The meeting came to an agreement on the importance of teaching students in mathematics and science departments about computers.

Computer courses were made part of the TC curriculum, but only for students in the Mathematics and Science departments. Students in Mathematics are required to study two computer courses, Introduction to Computers and Mathematics and Computers, while students in the Science departments are required to study only the Introduction course (Ministry of Education, 1992).

a) The Introduction to Computers Course:

An Introduction to Computers course was put in action from the first semester of the academic year of 1992 for students in the mathematics and science departments. This course is compulsory for all students in the science and mathematics departments and it is organised to cover two credit hours and three teaching hours to serve the following main aims:

- To teach students about the computer and the components of the hardware and the role of each part;
- To teach students about the computer languages and the general uses of these languages;
- To teach the BASIC language and how to log on to some computer applications.

Various topics related to computer use are taught in this course, such as the importance of computers in society, computer components and their functions, operational systems, introduction to programming with special concentration on BASIC language, evaluation of computer software and some practical computer applications (Ministry of Education, 1992).

Table 2.15: The syllabus content of the computer course "Introduction to Computers" for students in Mathematics and Science Departments at Teacher College in SA.

Weeks	Topics
Week 1.	The important of computer in the society, development of computers and Computer characteristics.
Week 2.	Computer components and the role it plays in teaching
Week 3	Operational systems Introduction to DOS
Week 4	DOS commands: Files
Week 5	Directories: root directory, sub directory, pathname, and their commands: MKDIR, CHDIR, RMDIR
Week 6	Windows and their features
Week 7	Files commands: Open files, Copy, X Copy, Move, Print and the other features.
Week 8	Midterm examination

Continued: Table 2.15: The syllabus content of the computer course "Introduction to Computers" for students in Mathematics and Science Departments at Teacher College in SA.

Weeks	Topics
Week 9	Desk labels: labels, format, Disk copy, Check disk, Backup, Scandisk,
Week 10	Algorithm and structured programming
Week 11	Introduction to Programming
Week 12	BASIC and their commands
Week 13	Practising BASIC
Week 14	Instructional programs
Week 15	Exercises
Week 16	The final Examination

Reference: The introduction computer course syllabus in one of the Teacher Colleges (1999)

Table 2.15, shows the content of the syllabus of the course. It can be noticed that the content is consistent with the plan introduced in 1992 (Ministry of Education 1992). However, this content is seen as poor in teaching about the use of computers in the process of learning and teaching; it mostly concentrates on teaching about the concept of computers. Teaching about operation systems and programming dominates the course content, as seen in the table. Spreadsheets, databases, multimedia, the use of E-mail, the WWW and other topics, such as computer assisted learning, computer based teaching etc are not covered by this course.

b) Mathematics and Computers Course:

Students in the mathematics department are required to study a second course in computer studies. The course called, "Mathematics and Computers" covers two credit hours and two teaching hours. A previous requirement is the Computer Introduction course. The course is organised to serve various objectives, namely:

- To teach students about the fundamental mathematics elements for computers;

- To familiarise students with the new trends in teaching mathematics issues related to information technology;

- The use of computers in teaching mathematics, with some examples of problem solving applications.

The content of this course covers various topics, such as the primary system, Algorithms and flowcharts, Pseudocode, combinatorics and Principles of Counting, graph theory, Boolean Algebra, and building some computer programs.

To facilitate teaching these courses, a special room in each college was equipped with 20 computers, type MSX 350, which are similar to the BBC machines in the UK. These types of machines were supplied by Alalamiayah Computer Company and worked only with specific types of software produced by the same company. However, later on these machines were replaced with IBM compatible computers with 486 SX33 processors and one megabyte of RAM equipped with disk-drivers and a hard-disk capacity of 80MB. Each of these machines worked separately and was not connected to any network or any server.

Most of the software loaded to these machines, is generic software such as Word processor, Spreadsheet and Database. The BASIC and Visual BASIC languages are loaded to these machines to familiarise students with these languages.

c) The Proposed Computer Literacy Course:

One of the main points that the Teacher College Committee discussed in the Fifteen Circles in 29/6/1997 was the possibility of adding a computer literacy course for the Teacher Colleges' Curriculum, since computers and their technologies were getting to be important for people's lives. Therefore, the Committee came to an agreement on the importance of such a course. A course draft was put together by an expert in computer technology and a member of the Faculty of Computer Studies at King Saud University in Saudi Arabia and it was proposed that as from the beginning of the academic year of 1997-1998, it would be taught to all Teacher College students in all departments.

The course is called "Computer and learning", and the teaching load is four hours weekly for one term (16 weeks). The course designer suggested 8 hours for the examination work, practical and theoretical, 28 hours for theoretical teaching and 28 hours for practical teaching (Ministry of Education, 1998b).

The Objective of the Course:

The course organiser expects that students, after completing the course will be:

- knowledgeable about computers and their applications in education;
- aware of the general components of the personal computer;
- aware of the computer operation system and able to operate it;

- aware of the different types of computer programs to raise the qualification of productivity;
- able to use the computer to increase their knowledge and personal productivity;
- able to understand the meaning of the Internet concept and to use it in their teaching;
- able to use the computer as a teaching tool;
- able to evaluate and use the educational computer programs available in the market.

The Content of the Course:

The content of the course is divided into five sections and each section is limited with a set number of hours, as seen in the course outline in the following table.

Table 2.16: Outline of the proposed computer and learning course

Outline of the computer course plan	Descriptions	Semester hours		
		Theo. H	**Prac. H**	**Total H.**
A) Computer literacy	**1) Computer definition** **2) Computer components** **3) Characteristics and capabilities of computers** **4) Type of computers and the capability of each type** **5) Viruses** **6) Computer operation systems: Dos Windows**	**6 hours**	**6 hours**	**12 hours**

Continued: Table 2.16: Outline of the proposed computer and learning course

Outline of the computer course plan	Descriptions	Semester hours		
		Theo. H	Prac. H	Total H.
B) The use of computer as a productive tool	**1) Word processing, and Desktop Publishing.** *** Types of word processing and DTP.** *** Preparing documents with the use of word processing and DTP** *** The features of word processing and DTP.** **2) Power point applications** *** The general use** *** Components of programme** *** The general features of power point.** *** How to apply power point to teaching class, build back up ground, save and print out results.**	**8 hours**	**4 hours**	**12 hours**
C) Computer and network	*** Local Area Networks** *** Internet and their services** *** Email** *** World Wide Web,** *** News, and how to browse them** *** Practical training in some educational implications.**	**4 hours**	**4 hours**	**8 hours**
D) Computer assisted learning	*** Definition of terms** *** Characteristics of computer assisted learning as away of learning.** *** The scientific research results about this type of learning,** *** Obstacles to the effectiveness of this type of learning.** *** How to select and evaluate programs * Integrating computer into the regular curriculum.**	**6 hours**	**6 hours**	**12 hours**
E) Computer based education management	*** Definitions** ***How to use computers to manage the students' examination scores term by term or the final results.** *** How to write a report about the students' engagement in the school activities or about their achievement.** *** How to use computers in work assessment.**	**4 hour**	**4 hours**	**8 hours**

Reference: Ministry of Education (1998b)

The content of the course, as seen in Table 2.16, tried to cover most of the components of computer literacy, such as the definition of computer literacy, the use of the computer as a productivity tool, computer and network, computer assisted learning and computer based management. The plan was set to cover all these topics during one semester, via theoretical and practical classes. However, this course has not yet been taught (as of the beginning of the academic year of 1999-2000). The reason for that, as mentioned by responsible people in Taif TC, was the shortage of resources.

2.6. Summary:

This chapter has attempted to set the present study in context, by showing how the planning and provision of teacher training, and the TCs in particular, fit into the Saudi education system as a whole.

It was shown that SA has parallel education systems for males and females, and a complex administrative structure in which four main authorities have responsibilities in relation to education.

General education in the Kingdom consists of three main stages: primary, intermediate, secondary; the last of these prepares students for college or university. Technical and vocational education is also available.

In the relatively short period since the introduction of formal education, enormous quantitative development has been achieved in the effort to combat illiteracy and promote socio-economic development. The increasing demand for education at all levels has led to great emphasis on expanding and upgrading teacher training. TCs, as part of this provision, offer four- year programmes qualifying graduates to teach in primary schools. Computer courses form part of the training at these colleges, but so far only for those specialising in mathematics or science. Decisions relating to available resources and staffing for these and other courses are subject to a complex, three-ties administrative hierarchy from the College Board, through the TC Administration, to the Deans Committee headed by the Minister of Education.

It is hoped that the background information in this chapter will aid understanding of issues related to curriculum, funding, staffing, and so on, which may prove to affect computer training and use in TCs. These will be examined empirically in later chapters. First, however, it is appropriate to review the literature on computers in education in general and in teacher training in particular.

CHAPTER THREE

REVIEW OF LITERATURE

CHAPTER 3

Review of the Literature

3.1. Introduction:

The use of information technology in the field of education is growing very fast. Educators see it as part of the broader field of educational change (Grunberg & Summers 1992). The introduction of microcomputers into education in general and into the teacher training field, in particular, has increased awareness among teachers and students that they can be a productive tool in developing new methods and learning environments (Byrum, 1993). Researchers in the field of teacher training have investigated the increasing benefits of computers and their applications for trainees and trainers in teacher training institutes. Typically, teachers and students can employ a wide variety of software packages in their teaching if they are familiar with the merits and deficiencies of these packages in different educational contexts.

This chapter provides an overview of relevant studies as a background for the project discussed in Chapter 1. The major topics in this chapter include: the development of computers in education; computer use of teaching staff and students of teacher training institutes; the trainees' and their trainers' knowledge and attitudes toward computers and their impact on the use of computers; and the factors that might affect infusion and adoption of computers or impede their use in schools.

3.2. The development of computers in education:

The development and commercialisation of the microcomputer in the early 1970s provided the means to develop the computer and place the power of computing onto the desktops of millions of people. Schools have been part of this movement. From the 1970s, and continuing through the 1990s, education authorities in many countries added this equipment to the schools.

The 1980s showed a rapid increase in the infusion of new information technologies in most societies. Cuban (1986) carried out a study of teacher use of machines since 1920 that gives a broad technological perspective on the problem associated with the use of machines in teaching. His aim was to determine "to what degree did teachers use a series of technologies aimed at making teaching and learning more productive" (p. 217). In criticizing previous literature on computer uses in education, Cuban (1986) pointed out that no study of teachers' use of technology can be carried out without an acute sensitivity to the conditions under which teachers work in schools. From his study, he reached two conclusions: first of all, that technologies went through a cycle that he describes as "exhilaration- scientific credibility-disappointment". His second conclusion was that teachers' use of technologies seldom exceeded a fraction of the school week, for even the most committed users. He suggested that teacher use of computers "will be tailored to fit the teachers' perspective and the tight contours of schools and classroom settings" (p. 218). He added:

"Within the ways the schools are currently structured (the graded school, self contained classroom, a segmented curriculum...) teachers teach the way they do simply to survive the impossibilities inherent in the workplace. The choices teachers face are to continue to do the best they can with what they have, or to risk what seemingly works by trying to meet ... expectations that are out of sync with organisational realities... It is not (lack of) funds that spells success or failure (for educational innovations), it is the high personal costs that teachers have to pay when they try to implement different ways of teaching within current organisational structures and beliefs" (p. 221).

In a survey conducted by the International Association for the Evaluation of Educational Achievement (IEA) to collect longitudinal and cross-national comparative data in order to contribute to the evaluation of policies on the introduction of computers in the eighteen countries that participated in the project, Pelgrum and Plomp (1991) summarised the findings. They found that, throughout the world, there is a continuous development in the access of schools to computers: increasing amounts of computer equipment are installed in schools and -gradually- increasing numbers of teachers/students are using computers for instructional purposes. In the USA, for instance, during the 70's and continuing through the 80's from 300,000 to 400,000 computers per year were purchased and added to schools in the country, and this steady growth in the number of computers has begun to have an effect on most teachers' and students' school lives (Becker 1991).

The notion that computers are playing an important role in the life of every citizen has ceased to be a matter for debate. Becker (1993) reported that computers were adopted for schools for the first time in 1989, under very different circumstance than in the year of 1979, since the immense variety and capacity of computers dwarfs the instructional power of the early machines in the previous time. Rosen (1995) reported that in 1983 the National

Commission of Excellence in Education in the US announced the importance of computing and regarded it as the fourth basic skills after reading, writing and arithmetic. By the autumn of 1983 the use of computers in schools was double that of the year before and the number of schools having computers reached to 55, 000. Two years later (1985) about 82% of elementary schools and about 92% of secondary schools offered computer instruction. By the end of the same decade each K6 School in the US was estimated to have 20 computers, and each secondary school was estimated to have 45 computers (Rosen, 1995). This rise in computer use has been accompanied by growing requirements for teachers to be prepared for the use of computers (Adams, 1998).

Information technology in English State secondary schools in the UK used to be under the technology curriculum. However, in the revised version of the Curriculum introduced in January 1995 it has been separated (Crawford, 1998). This move, Crawford suggested, reflected the importance of IT throughout the curriculum. Moreover, a variety of curriculum models for teaching IT have been proposed. The variety in Information Technology models has its impact on the students who are trained to be IT teachers. On their teaching placements in the secondary schools, as Crawford (1998) remarks, students may find a wide variety of different curriculum models in teaching IT, pupils of similar levels of skills, knowledge and understanding may be taught in different years, and they may be instantly de-skilled as the hardware and software they are required to use is different from or older than that which they have previously experienced. Crawford (1998) suggested several strategies for initial teacher training programmes to overcome these problems. Some of these strategies were to encourage students to participate in different and wider contexts. Workshops and seminars are preferred, so individual concerns can be discussed. Students should be aware of the wide possibility of differing experiences in teaching in different circumstances, and be prepared to be flexible and supportive of schools and teachers. Students must be encouraged to be productive, reflective and autonomous by discussing learning strategies to deal with and to be able to identify their own needs for IT skills and to train themselves.

3.3. Teaching staff, pre-service student teachers and the use of computers:

The use of computers by college staff and teachers and by pre-service student teachers has been the focus of several studies. Since each of these groups has different characteristics, the computer use of each group is discussed separately.

3.3.1. Teaching staff and the use of computers:

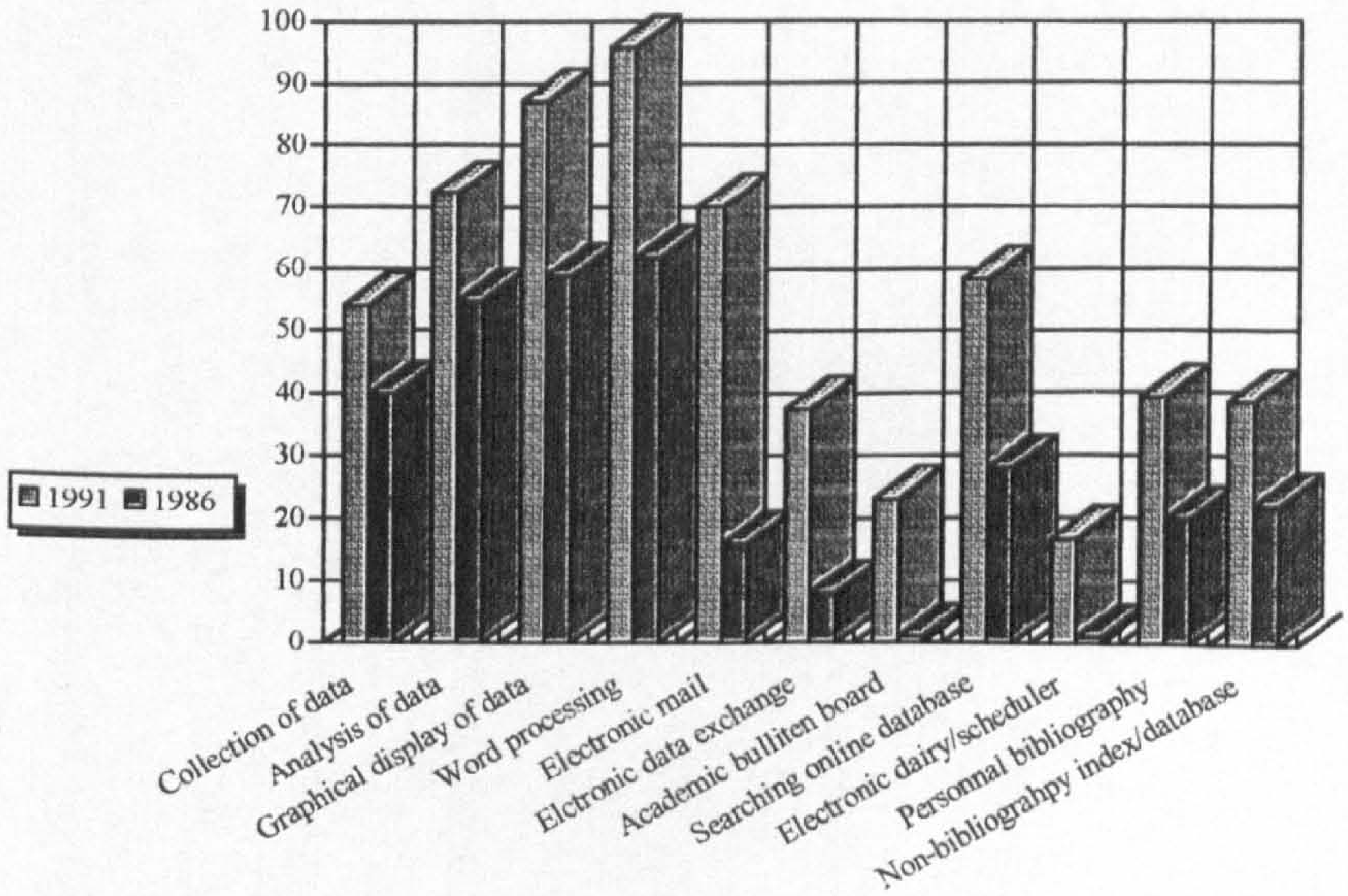
Lehman (1985) surveyed about 1,270 science teachers in 340 USA high schools. He found that 77% did not use computers in their teaching. Similar results were revealed by Kherlopina and Dickey (1985). However, from that time on the computer use has been growing and developing gradually.

Becker and the Center for Social Organisation of Schools at Johns Hopkins conducted four national surveys of computer-using schools and teachers throughout the 1980s (Becker, 1985; Becker, 1986; and Becker, 1991) in an attempt to understand the uses of computers in the school. They reported that computer acquisition seemed to be continuing to grow with no real diminished demand in sight, yet with this growth in accessibility of computers in the schools there had come little change in the number of teachers and students claiming to be major computer users (Becker, 1991).

Turning to the situation in Saudi Arabia, Fodah (1990) studied the computer experience among educators, their knowledge, training needs and their attitude toward computers. The population of the study was drawn from college staff in Riyadh City. A questionnaire survey was used to gather data about the study from 119 male and female participants. With regard to their experience with computers, Fodah found that over three-quarters of the sample (77%) had never used any kind of computer. Fodah, as part of the study she investigated the respondents main source of learning about computers. She listed four main sources: movie and television; books, newspapers and computer magazines; friends; course work. The results revealed that about books, newspapers and computer magazines was the main source for about 48%; course work for 39%, movies and television was a source for about 35% and 31% of the respondents indicated friends as a main sourcee for learning about computers.

Bukhari and Meadows (1992) carried out an interesting comparative study on the use of information technology by scientist staff and research students in universities in Britain and in Saudi Arabia. One of the important differences found was that whereas all respondents in the UK universities in 1991indicated that they were making some use of information technology, more than 26% of the Saudi Arabia respondents replied that they were making no use of it at all. Bukhari et al. (1992) suggested that comparison between the two populations (scientists only) indicated that the level of information technology use of scientists in universities in Saudi Arabia in the early 1990s was similar to the use of scientists in the UK in the mid-1980s. Bukhari and Meadows (1992) stated: "The use of computers in Saudi Arabia is much less diversified than in the UK, for Saudi Arabian scientists typically employ one type of computer only. In fact, 70% use stand-alone micros almost exclusively: as against 22.5% who concentrate their usage on mainframes and a small group (7.5%) who use networked micros. The great emphasis on stand-alone micros can obviously be related to the low level of usage of IT for communication in Saudi Arabia"(p. 413). The other interesting element in this study was the tremendous growth in the use of computers for different activities between 1986 and 1991 among UK staff. Figure 3.1 shows the percentages using computers for various purposes in 1986 and in 1991, according to Bukhari and Meadows (1992).

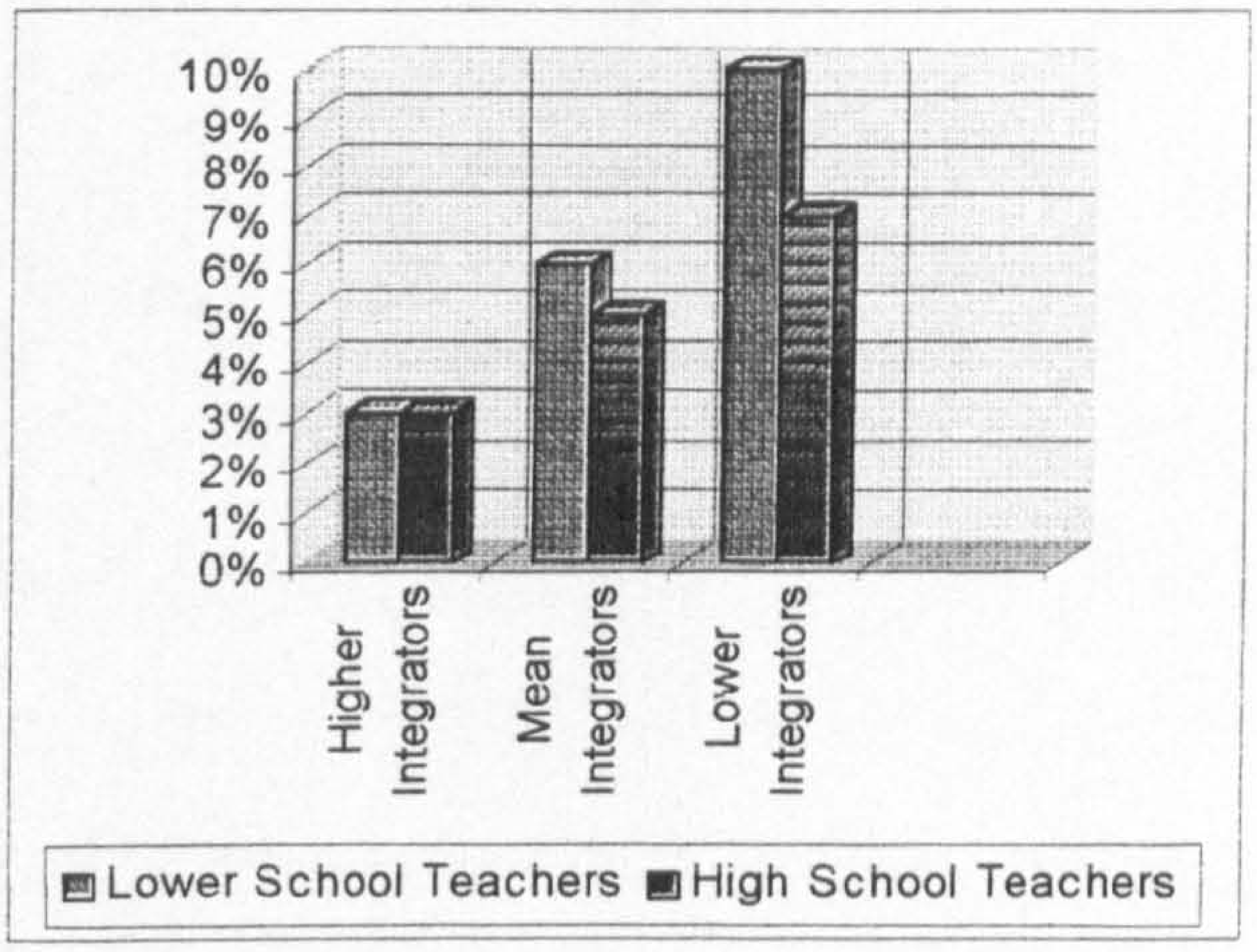
Figure 3.1. Percentages of staff in the UK surveys who use IT in different activities according to Bukhari and Meadows (1992)



Source: Bukhari and Meadows (1992)

Reinen and Plomp (1993) reported on an international research project, "Computers in Education" (Comped), carried out by the International Association for the Evaluation of Educational Achievement (IEA). In this project, secondary school teachers' integration of computers in schools across countries was investigated. Two kinds of secondary schools were used, lower secondary schools and upper secondary schools. An instrument developed by Pelgrum and Schipper (1992) was used to measure the teachers' integration of computers into three subject areas (mathematics, science and mother tongue). This scale consisted of a 10-point scale based on the number of subject matter topics for which teachers of the existing subjects (mathematics, science and mother tongue) indicated computer use. Three categories of using teachers were defined: Low integrators (with score 1,2 or 3 topics in which computers were used), mean integrators (with 4,5,6 or 7) and high integrators (with score 8,9 and 10). Teachers who did not integrate computers into existing subjects were defined as non-users. The results revealed that 81% of lower secondary school teachers and 84% of upper secondary school teachers were categorised as non-users. Only one out of ten of the lower secondary school teachers and 7% of the upper secondary school teachers were categorised as low integrators while 6% of the lower secondary school teachers and 5% of the upper secondary schools teachers were mean integrators. Only 3% of lower and 3% of upper secondary school teachers were categorised as high integrators. Figure 3.2 illustrates the results.

Figure 3.2: The regular computer use of teachers in lower and higher secondary schools according to Reinen and Plomp's Results (1993)



Source: Reinen and Plomp (1993)

For knowledge about and skills in using computers in the Comped project reported by Reinen and Plomp (1993), self-rating scales were included in the teacher questionnaire. The instrument consisted of nine questions about knowledge of hardware and software with yes/no questions.

The results of this study revealed that teachers in elementary schools scored lower on these self-rating scales than teachers in lower and upper secondary schools. The scores of the computer teachers did not differ greatly from those of using teachers in existing subjects. Teachers using computers in existing subjects had more knowledge than their non-using colleagues. Significant differences in lower secondary education were found between the three subgroups of using teachers (low integrators, mean integrators and high integrators) and the group of non-using teachers on the self-rating scale, indicating that the group of high integrators had most knowledge and skills. In upper secondary education, the user teachers were significantly different from the non-user teachers, and the group of low integrators differed significantly from the high integrators.

Waxman and Huang (1993) in their investigation of the use of computers in about 200 urban elementary and middle schools in a district in the south central U S, found that elementary teachers did not use computers at all, even though there was an average of one machine available per classroom. Middle school teachers used computers about 2.1% of their time in class. Marcinkiewicz (1994) studied 163 elementary teachers and he found that many of them either did not use computers, or used them on a very limited basis. More than two out of every five did not use computers at all.

Al-Mohaisin (1993) found a great lack of computer knowledge among science teachers, science teacher advisors and science teacher trainers in Saudi Arabia. Although only basic knowledge about computers was involved in many of his questionnaire items, respondents could not give the correct answers to most of these items. Most respondents lacked knowledge, had a weak background and were somewhat limited in the use of computers. This limitation of computer knowledge may perhaps, as Al-Mohaisin mentioned, be attributed to the lack of computer literacy courses in the Saudi Arabian education sector. The result shows that 78% of science teachers, 85% of the science teacher advisors and 69% of the science teacher trainers had no computer experience. Moreover, he reported that 76% of the science teachers, 64% of the science teacher advisors and 75% of the science teacher trainers had not attended a computer course at all, while 95% of science teachers had not attended a computer course specifically related to teaching. Because of this result, Al-Mohaisin declared that the lack of computer knowledge among science teachers in Saudi Arabia could create a real problem in introducing computers into science teaching. Many respondents indicated that they would not use computers in their teaching unless they were trained to do so.

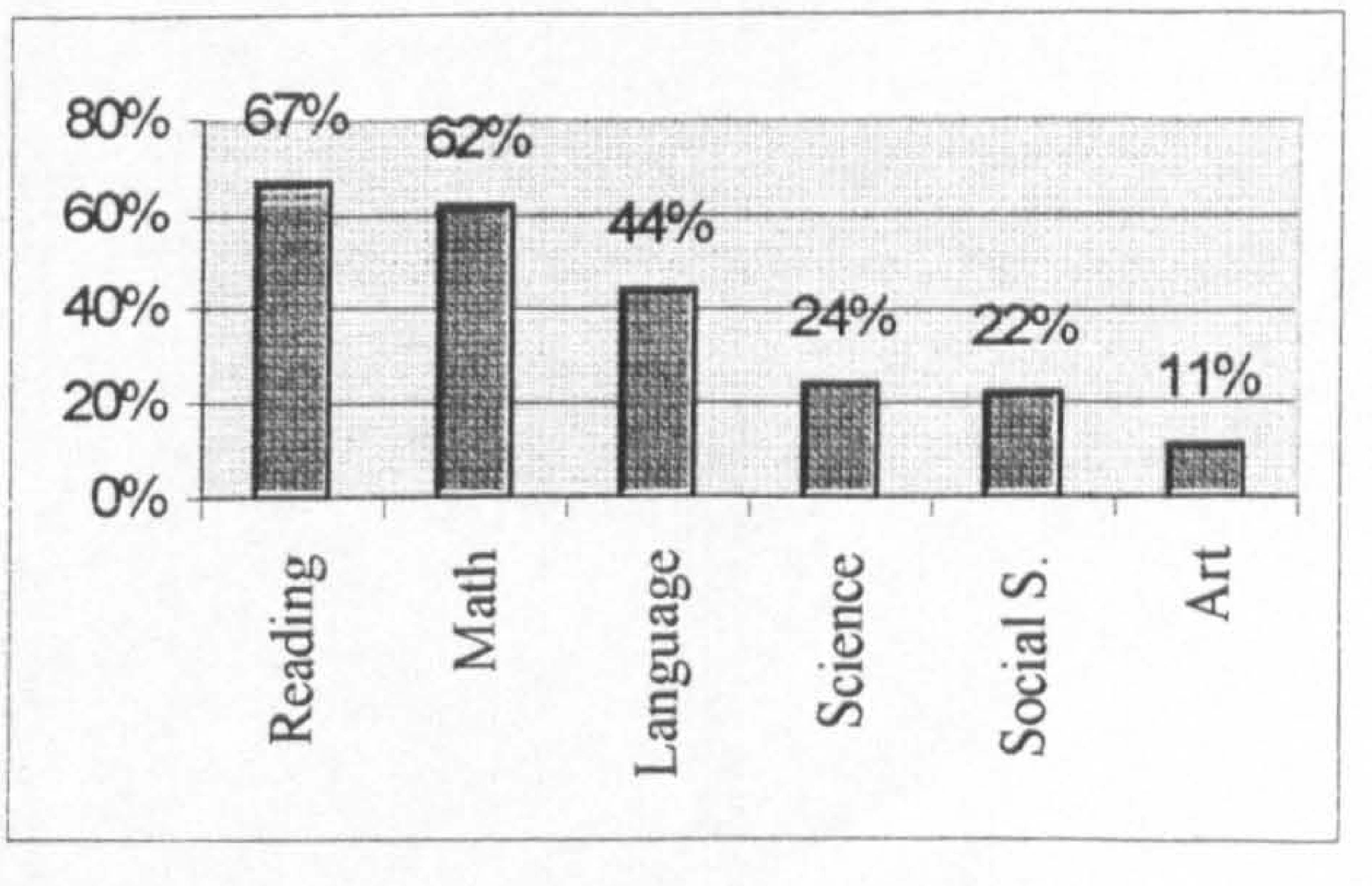
Byard (1995) investigated the extent and use of IT by staff and students in the School of Education in the initial of training teachers at the University of Leeds during the academic year of 1992-1993. The survey was undertaken in three phases. In the first phase, interviews were held with 37 staff teaching in the PGCE Primary and Secondary courses; mainly with staff concerned with the method courses. Staff teaching seven other method courses completed a questionnaire concerned with information about the ownership and use of computers, difficulties faced and details concerning the approach to IT followed during the PGCE course. The results of the first phase, for staff, were as follows:

> "There was little commonality of response, chiefly because of the nature of the subject matter, i.e. the way it lends itself to an IT approach and the priorities (and attitudes) decided by the method course tutors. Most method courses devoted specific time to examining ways in which particular software packages could be used, and all method courses attempted to integrate the use of IT into their activities"(p.131).

Beck (1997) mentioned that according to the Office for Standards in Education in the US report of 1995, 34% of secondary and 56% of primary teachers make regular use of IT and 35% of the secondary and 25% of primary teachers reported that IT had made a substantial contribution to teaching.

However, a more favourable view of computer use among public school teachers was presented by Blankenship (1998) who found that about 77% of them used computer technology in their teaching during a typical week. Moreover, he reported that 32.2% of the survey population used computers four or more times during a typical week, 44.3% used them sometimes during a typical week while only 23% did not use computer technology at all during the week. Blankenship (1998) also found that teachers varied in their use of computer technology in their teaching according to their subject matters. Figure 3.3 shows the rate of computer technology use in Blankenship's study.

Figure 3.3. Computer technology use according to teaching subject matters in Blankenship's study (1998)



Source: Blankenship (1998).

Hohensee (1998), in a study of computer use by middle school teachers in Georgia, U.S.A., found that teachers used computers for instructional purposes more often than for administrative or communication purposes. Nevertheless, he reported, computers remain, for the most part, underutilized as an educational tool.

3.3.2. Pre-service student teachers and the use of computers:

The situation of computer use among pre-service student teachers is similar to that among serving teachers. Summers (1990b) found that 70% of a BEd intake had little or no experience of using computers at schools they had previously attended. Goodwyn (1991), in a comprehensive survey of IT in English in a selection of ITTEs, examined IT policies and practices across a range of institutions. Goodwyn stressed the need to create effective links with schools regarding IT practices and the importance of ready access to IT resources by staff and students, as well as development of expertise in IT by the staff of the institutions.

Blackmore et al. (1992) reported a wide study carried out in eight initial teacher education institutions individually in the UK between 1988 and 1990. The collection of existing data could, as Blackmore et al. mentioned, "indicate a national need for differentiated courses and for curriculum development in the use of information technology in the field of initial teacher education" (p. 242). Data in these studies show a high variation across both institutions and courses. Even though the results in general showed that a majority (90%) of students had some experience of computers, only one out ten of the Liverpool sample rated their computer skills as good or excellent. In Swansea University College about one fifth of the students could not use a pre-loaded program and about four out of five felt unable to connect up hardware. While in Oxford University only about 15% of the whole group indicated that they could use a word processor. Interesting results were found about those students at Cheltenham and Gloucester College, who had computers at home. When they were asked what they could do with them, the results indicated that about 23% unable to use them, 21% use them for word processing, 20% used them for games, 35% for games and word processing and only 3 respondents of 91 used them for other tasks. These results, as Blackmore et al. (1992) suggested indicated that having a computer at home did not necessarily increase confidence in computer use.

The extent of this experience depended on students' age and subjects of study. For instance, Exeter's older students and students in the Arts division had less experience than others (Blackmore et al. 1992).

Mellar and Jackson (1992), in a survey of IT in post-graduate teacher training at the Institute of Education of London University and Hatfield Polytechnic, found that almost two thirds of the student intake had little experience of using computers.

Downes (1993) reported that less than half of the primary student teachers at the University of Western Sydney showed use of computers in their final teaching, but an important factor in determining student use of information technology was the use made by the supervising teacher.

The second part of Byard's study (1995), mentioned earlier (p. 3.11), was a questionnaire distributed to all students in the primary and secondary PGCE course at the end of the first term. This questionnaire was concerned with the previous experience of the students in using IT; their knowledge of the IT requirements for their method; the IT activities which had been undertaken during the first term and the nature of the difficulties they had experienced. The response rate was 82% for the primary students and 61% for the secondary students. Byard sent a further questionnaire at the end of the teaching practice, as the third phase of the survey. In this phase, students were asked about their current IT confidence and their use of IT on teaching practice. Responses were obtained from 51% of the secondary students and from 43% of the primary students.

Students in Byard's study were asked to indicate the frequency with which they used IT in their lessons on teaching practice by placing a tick by one of four category statements (never, once, between two and five occasions, more than five occasions). The results showed that primary student teachers used IT in the classroom more than secondary student teachers did. While about 40% of the secondary student teachers never used IT in the classroom, this was so for only 7% of the primary student teachers. Moreover, 85% of the primary student teachers used IT between two and five times or more, whereas only 53% of secondary student teachers did so.

Byard (1995) argued that the differences in the use of IT between primary and secondary student teachers could be accounted for in several ways. One was that primary school teachers are often more responsible for the curriculum for a class and have more opportunities to use computers than secondary school teachers do. Another point mentioned was that the supervision in the primary school tends to encourage the use of computers in the primary school more often than in the secondary school. His last suggestion was that in primary schools, computers are more readily accessible. He emphasized in his comments that it is the responsibility of the ITTE courses to provide students with the initial awareness of IT.

Adams (1998) reports in his study (ICT in ITT) that from September 1998 all student teachers in the UK to be awarded with Qualified Teacher Status are required to achieve standards laid down in a new curriculum for ICT. However, he observed, as a PGCE tutor, that PGCE students lack the opportunity to use ICT during their teaching and moreover, their mentors sometimes feel unconfident to support them. Therefore, Adams (1998) looks to the results of a collaborative project between the Higher Education tutors and school-based mentors from the University of North London, which set out to enhance the use of ICT in the classroom for PGCE modern language students. The study creates an effective mode to measure the abilities of PGCE students in modern foreign languages, the use of ICT in the classroom and the management of the partnership. The study also, as Adams reported, examines the tensions and paradoxes, which arise from providing ICT training in partnership-based initial teacher education. Questionnaires were used to investigate the ICT students' skills at three different times; in the beginning of the course, in the middle after finishing the first teaching practice and a series of ICT workshops taught by the author, and at the end of their teaching course. Three computer skill areas were tested: computer operation, word processing and electronic communications. The findings suggested that PGCE students, as anticipated, came with different computer skills with total scores ranging from 6% to 100%. Adams mentioned also, that this variation in scores among students is not related to their age, country of origin, gender or previous field of study, even though all younger students were illiterate in ICT. The results also show that about three out of four of the group (25 students) achieved the average scores for word processing and operation skills, while only 29% of them did the same in the electronic communication field. Those who scored full marks in the three skill areas, operation, word processing and electronic communication were only 32%, 44% and 4% respectively. Most of the ICT skill improvement occurred in the period between the start time and the mid-point of the course, which suggests as Adams notes, that the fastest way to develop the students' ICT skills is in the higher education institutes rather than in the schools. The findings also showed a clear improvement for the majority of the students in their ICT skills by the end of the course, especially when those who scored full marks at the start of the course were removed from the calculation (78% showed improvement).

The results of the study in regard to the partnership use of ICT in the modern foreign language department were ambiguous. Whereas some respondents indicated that the majority of the department used ICT and there was a positive attitude toward it, two students reported that ICT was not used in the department with pupils, though it was used for other purposes and the majority (14 PGCE students) reported that ICT was not used in the department and there was a negative attitude toward it.

As a conclusion, the studies cited here were in agreement in finding that a relatively high proportion of teachers did not use computers, and many trainee teachers did not envisage using them in their future teaching, although the percentages of use found by Byard (1995), Blankenship (1998), Adams (1998) and Hohensee (1998) were greater than those in studies from the 1980s, such as Cuban (1986), Lehman (1985), Summers (1990b) and other studies in the 1990s (e.g. Blackmore et al., 1992; Waxman and Huang (1993). There is evidence that use may differ according to institution and academic subject (Blackmore, et al., 1992, Blankenship, 1998) but findings regarding the relative levels of use in primary and secondary schools are inconsistent. The few Saudi studies quoted found that students and educators had very little knowledge of computers and few envisaged using them in teaching. Interestingly, in one study, the position in universities in Saudi Arabia in the 1990s, with regard to computers, was likened to that in the West in the 1980s. Thus, there is evidence of a very low level of integration of computer technology into education in Saudi Arabia, which warrants serious investigation.

3.4. Teaching staff and pre-service student teachers' attitudes toward computers:

Attitude has been found to be a predictor of the adoption of new technologies such as computer use (Woodrow, 1992). Two prerequisites of attitude acquisition are verbal information and intellectual skills (Wagner, 1979), both of which can be transmitted through appropriate instruction. As Griswold (1983) noted, negative teacher attitudes toward computers might promote a resistance to learning about them and influence the acceptance and use of technology in the classroom. For this reason, it is of critical social and educational importance to research the circumstances in which teachers feel comfortable learning about and utilising the computer as an essential tool for learning. Teachers must get away from the idea that computers are somewhere "out there" and realise that computers are tools for human advancement and learning. Teachers seem to feel positive about the abstract concept of computers in education, but become anxious about their personal involvement with computers (Stevens, 1982). It is important, therefore, that computer training courses for teachers are designed to foster an attitude of commitment to actually utilise the computer in general and, particularly, in the learning process. Reece and Gable (1982) argued that introducing microcomputers into schools would be waste of time and money if the training curricula do not support the development of positive attitudes.

Bear, et al. (1987) went so far as to suggest that if students develop favourable attitudes toward computers, other objectives of teaching computers are secondary.

In this part of the review, attitudes toward computers of staff and preservice teacher students, their feelings, confidence and their anxieties are discussed. Moreover, as related to attitude, factors affecting and hindering computer use in schools are discussed in this part too.

3.4.1. Teaching staff attitude toward computers:

Chandra, et al. (1988) found that the more a teacher uses the computer personally, the greater is the probability of positive attitudes and increased use among students in her or his classroom. Similar results were obtained by Holley (1988), Dupagne and Krendl (1992) and Clemens (1995). Woodrow (1992) found that teacher training on computer skills made a significant difference in changing teachers' perception of the role of computers. Woodrow added: "The success of any new educational programme depends strongly upon the support and attitudes of the teachers involved" (p. 216).

In Saudi Arabia, Fodah (1990) as part of her investigation of the need for computer training for the college education staff in Riyadh, Saudi Arabia, investigated staff attitude in relation to nationality, educational degree earned, position and gender. The result indicated that respondents had a favourable attitude toward computers. When respondents were asked about their interest in learning about computers, an overwhelming majority (97%) expressed their interest. A series of tests were conducted to evaluate the associations between demographic characteristics such as age, gender, position, nationality etc. and the attitude variables, Need, Want, Confidence, and Anxiety. No significant differences were reported between these variables and the attitude sub-scales.

Al-Mohaisin (1993) reported in his investigation that science teacher trainers who had more years of experience had more positive attitudes toward computer use. They were found to be more willing to train science trainees to use computers in the pre-service training programme.

Even though science teachers in this study were found to have no training in computer use, the fieldwork showed strongly favourable attitude among all respondents. This result encouraged Al-Mohaisin to state:

> "Providing computer knowledge and awareness among the school staff in Saudi Arabia could encourage science teachers to adopt more favourable attitude toward the use of computers in their own classroom. It could encourage them to attend computer courses inside and outside their schools" (p. 11-17).

Yaghi (1996) believed that well-trained teachers and teachers who are comfortable with computers will have a positive effect on learners, whereas badly-trained teachers may model bad experience to students, who may then develop negative attitudes toward computers.

Beck (1997) defines a positive attitude as one of the important prerequisites for teachers to use information technology with confidence and apply it widely.

Smith (1998) asserted the importance of staff development programes that strengthen teachers' confidence in their ability to use computers. She found that, in the middle school system in Georgia, U.S.A., teachers who had training in Computer-enhanced instruction reported significant gains in computer self-efficacy and, hence, in the use of computers in the classroom.

An important element in computer use is the individual's attitude toward computers. The literature suggests that teacher trainers' attitudes may become more favourable through experience (Al-Mohaisin, 1993) or training (Woodrow, 1992) and this in turn may lead to development of more favourable attitudes among their students (Yaghi, 1996). The favourable attitudes reported in Saudi Arabia by Fodah (1990) and Al-Mohaisin (1993), even among staff who have not yet received training, are encouraging, suggesting that training opportunities, if provided, would be well received.

3.4.2. Pre-service student teachers' attitude toward computers:

Research has shown that pre-service teachers' initial attitude toward technology may either positively or negatively impact their future use of educational technology in general and specifically in the classroom.

In Summers' study (1988), students concerned mainly with a one -year primary school teacher-training programme were asked to express their feelings about computers.

42% of the population, expressed negative feelings and only 30% reported positive feelings.

In a later study, Summers (1990) asked students at the start of a one-year secondary postgraduate teacher training course about their gut reaction about computers. Students' responses showed that 47% reacted positively while 34% reported negative feelings. Students who expressed negative feelings were asked for a brief explanation. 30% of them indicated that their negative feeling was due to their ignorance or lack of experience. However, the rest put their negative attitudes down to bad experiences, insecure feelings, being unhappy about technology and associations with its effects, mathematics, programming, etc.

Wilson (1990) investigated the preparedness of teacher trainees for computer utilisation in Australian teacher institutes, among a similar group to that examined by Summers (1988) in Britain. One of the main questions in the study was directed to the teacher trainees' feeling about computers and computer utilisation in the educational process. The results revealed that a majority of the students expressed positive feelings about microcomputers. 41% indicated that they had very positive feelings, 24% expressed negative feelings and 35% were neutral. However, as Wilson mentioned, even though the majority expressed positive feelings about computers and their utilisation, 68% still felt inadequate with regard to computers and 22% felt nervous when using them. Wilson reported various reasons for the respondents' nervousness, such as the association between computers and mathematics, the computer terminology, the computer programming language, the acquisition of keyboard skills and, for women, the feeling that computers is a male-dominated area. Wilson also examined students' feelings about the effect of computers on society. The results revealed that 54% of the study population did not feel that computers were having a detrimental influence, while about 30% felt that computers did. However, almost all the sample, 95%, reported that computers are very important for teachers and they have to know about them. The main reason for saying that was, as they mentioned, the significant role that computers play in today's society.

Woodrow (1992) measured the change in knowledge of computers and attitudes toward computers among 36 pre-service teachers enrolled in an introductory computer-training course. Pre-test and post-test were used to determine changes in computer literacy and attitudes toward computers. Six attitude dimensions were investigated: Computer Anxiety, Computer Confidence, Computer Linking, Computer Interest, Computer Awareness, and Computer-Ability and Gender Equity. The results revealed that significant gains were achieved as a result of the programming training course on all attitude dimensions except the Computer Confidence dimension. The attitudinal gains made suggest that the students felt positive about their learning experiences in the programming-oriented computer-training course. As a conclusion, Woodrow reported that training in computer-programming skills results in an improvement in attitudes toward computers.

Blackmore et al. (1992) provided data from a variety of Initial Teacher Training Establishments (ITTE) concerning students' previous Information Technology (IT) experiences, skills and attitudes. At Loughborough ITTE, there was marked difference between the Post Graduate Certificate Course (PGCE) primary and secondary students regarding their personal confidence ratings in using computers, with only 6% of the primary students having an above average rating compared with 37% of secondary students. At Worcester College, of the students enrolled for the Bachelor of Education (BEd) degree course, only 16% showed some confidence with computers. At Cheltenham and Gloucester College, the overall results indicated that half of the population had no confidence in using computers. The results revealed also that science and secondary PGCE students seemed to be more confident than arts and primary students.

Jones, et al. (1994) noted that for many students, particularly girls, "attitude towards computers is a primary predictor of choices to engage in computing activities and of achievement in these activities" (p. 315).

Huang et al. (1995) surveyed the general attitudes of teacher education students toward computers in terms of comfort, value, liking, gender and related differences, and the effect on attitude of some background characteristics, such as years in college, length of computer use, type of and computer used. The participants were 215 teacher education students (30 male, 185 female) enrolled in the upper division university in the south central region of the United States. The general results indicated that teacher education students valued educational computing very highly and felt quite comfortable with computers. Those who had spent more years in college and had used a variety of computers for a longer period of time reported feeling more comfortable with computers and found computers more valuable.

Al-Jabri (1996) concluded from his study about the gender differences in computer attitude among secondary school students in Saudi Arabia that, even though there was a significant difference between the two genders, where male students revealed less anxiety about learning and using computers, all respondents indicated a high positive attitude. Therefore, he recommended designing a comprehensive computer package for all social, economic and technical aspects.

Blount (1997), in an experimental study, tested pre-service students teachers' attitudes towards computing and related technology. He found that utilisation and integration of computing and related technology skills in curriculum and instruction resulted in pre-service students having more positive attitudes towards use of computing and related technology in curriculum, instruction and research.

Gunter et al. (1998) studied the effect of an introductory computer course on the attitude toward learning and working with computers. The students' anxiety, confidence with computers, computer liking and computer usefulness were sub-scales tested through before and after a one semester computer course. The t-tests results revealed statistically significant differences between the pretest and the posttest among the four sub-scales. The results indicated that students after finishing the computer course had less anxiety toward technology, more confidence and found computers more useful for them

Levine et al. (1998) found interesting results when they studied the relationship between students' attitude toward computers and their confidence and their computer knowledge, computer ownership at home and at school and the frequency of computer use. The population of this study was 309 students in Grades 7-12 from 10 non-vocational schools. The results of this study, as reported by Levine et al (1998) revealed that students with more knowledge had more positive attitudes toward computers and more confidence in using computers.

Western literature suggests that a relatively high percentage of pre-service teachers have negative attitudes to computers, such as lack of confidence (e.g. Summers, 1988, 1990; Wilson, 1990), though attitude may vary according to subject area and the stage of education in which trainees are preparing to teach (Blackmore et al, 1992). However, they accept that teachers need to know about computers because of their impact on society (Wilson, 1990), and there is evidence that attitudes can be improved by training (Woodrow, 1992; Blount, 1997; Gunter et al. 1998).

Most of these studies were in agreement on the importance of attitude towards computers in encouraging or hindering computer use in school. However, other studies identified other factors that may impede teachers' use of computers. In the next section some of these factors are discussed.

3.5. Factors affecting or hindering the use of computers in schools:

Why is it that, even though computers are available in almost every school in the developed countries, so many teachers do not use them? Furthermore, why are pre-service teachers not planning to use them? The infusion and adoption of computers in schools has been found to be affected by several factors, such as teachers' perception about the teacher's role, availability of computer resources, the equipment cost effect and the computer knowledge and type of computer training teacher received.

3.5.1. Teachers' perception of their role:

Many studies have offered some suggestions as to the barriers that hinder computer use by current and pre-service teachers. Some researchers published findings based on an in- depth case study of the implementation of computers in the UK secondary school (Bliss, Chandra, & Cox 1986; Chandra, Bliss & Cox 1988). In their research, they looked at the factors that influence implementation of microcomputer use in a school at the teacher, department and school levels. At the level of the teacher, the authors analysed the teachers' use of computers and their experiences and views about them and they found that changes to the existing role of the teachers were an important factor that influenced computer uptake. Bliss et al. (1986) categorized those changes into three broad areas: changes in confidence, changes in competence and changes in the teaching situation.

Chandra (1986) reported that teachers perceived themselves, by reasons of their personality or abilities, as not being able to acquire this new expertise. They saw themselves as not 'logical or mathematical', 'too old' or 'too set in their ways' for this new educational technology (Chandra et al. 1986, p. 289).

Perelman (1992) mentioned that some teachers fear replacement by computers; as a result of that, they do not use them, though Jordan (1993) believed that computers, as non-judgmental instructors, could not replace the human contact and interaction that students always need.

Abdal-Haqq (1995) believed that the teacher education community had made some efforts to overcome these obstacles. Required courses in the use of instructional technologies for pre-service teachers and guidelines that address content and pedagogical studies for initial teacher preparation were recommended.

In the US Office of Technology Assessment report in (1995), it was suggested that teachers have become confused about unclear demands on educators and confusing advice on the best ways to use technology. As technology has evolved in teaching, different technological approaches were suggested, from teaching programming, to encouraging drill and practice, to acquiring computer literacy and participating fully in electronic communications. These different strategies confuse teachers and frustrate administrators.

Edwards et al. (1998) believed that despite increased awareness at universities' management level of the usefulness of the new technologies for educational activities, such as academic management, student administration, staff recruitment, development of electronic media, etc., teachers resist using them regularly. Moreover, they thought also, that some students in the universities oppose the use of technology in teaching in higher education, since they fear to harm the relationship between the teacher and the students. For these two reasons, teachers' resistance to technology use and students' fears of harming the relationship between them and their teachers, Edwards et al. (1998) suggest that universities should create a combination of traditional and new learning and educational technological services to familiarise teachers with new pedagogical approaches and provide students with electronic support. They added that most European universities presently pay much attention to the allocation of resources to be used to encourage staff involvement in technology, but not enough incentives are given to teachers to integrate technology in education and to develop learner productivity. They insist on the importance of encouraging the creation of more permanent collaborative structures in campus and across institutions and organisations.

One possible reason for teachers' apparent resistance to the introduction of computers is provided by Murphree (1998). In this study of high and low technology-using middle school teachers in Mississippi, it was found that the time factor pervaded all levels of the educational environment and appeared to hinder teachers' efforts to use computers.

3.5.2. Availability of computer resources:

Ellis (1986) observed teachers in an elementary school in Sheffield and later verified his results in four other schools. He identified the management of computing resources throughout the schools as an important factor in the use of computers for teaching. Ellis argued that computers should be readily accessible and transportable and teachers should be given up-to-date information on all available resources.

In Saudi Arabia the result of Fodah's study (1990) showed that Saudi respondents had little access to computers. Only 55% of the population surveyed had access to computers at work, while 53% had their own computer at home and about 23% had access to computers in their friends' or relatives' houses (some respondents gave more than one answer). Non-Saudis had more access than Saudis and teachers with more advanced degrees had more access to computers. Therefore, Fodah emphasised the importance of providing more access to computers to be used with more flexibility.

Pelgrum et al. (1993a) reported that in many of the educational systems that they had studied, access to computers was not available for all schools. In 1989, the time when the study was carried out across 19 educational systems, in Japan and Portugal, only 25% and 29% of the elementary schools respectively had access to computers. The number of secondary schools in the educational systems participating in the study that had computers, varied from 4% in Greece to 100% in the USA. However, as reported in the study most of the respondents in this study complained about the limitation of the computers available, and some mentioned the lack of a sufficient number of computers among schools. Abdal-Haqq (1995) also, suggested that the most common reason given for the low level of computer use in schools is shortage of computer equipment.

Tutorial staff in Byard's (1995) study indicated access to computers as a major problem for their PGCE students. They indicated that even though access to computers was available around the campus in various locations, classes were too large, as many as 73 students. Moreover, using computers in different locations in the university needs multi-site supervision, which may not be available.

Even though many schools in the US had made substantial investments in hardware and software, the Office of Technology Assessment reported in 1995 that many schools still lacked the basic technology infrastructure to support the most promising application of educational technology. As stated in the report, half of the computers in the U.S. schools were older, 8-bit machines, that could not support the CD-Rom sized databases or network systems. While some of the schools, as mentioned in the report, did not always make the most of the equipment they already had, others did not locate it in the appropriate place, the classroom.

Gay (1997) revealed that access to computers seemed to dominate the teachers' description and responses throughout his research. Non- availability of access to computers, both at school and at home, was found to be one of the major issues that limited the time and energy in devoted to learning how to teach with the use of computers. Gay also found that access to computers at home was a very important part of the process of integrating technology into the teacher's class, since it allowed them to learn new skills, troubleshoot, review materials, do grades and produce tasks at their convenience. He also mentioned that most of the teachers he surveyed reported that time spent in training was of little value to them until they had reliable access to machines.

In Georgia, U.S.A., Hohensee (1998) found that teachers' use of computers is significantly associated with the extent of the participation in decisions regarding computer technology and by computer access. He suggested the placement of a computer in each classroom.

Smith (1998), as part of a study to evaluate a Computer-Enhanced Instruction professional development, also in Georgia, U.S.A., examined elementary school teachers' self-efficacy in the use of computers and found it to be significantly, positively associated with home access to computers.

Levine et al. (1998) found in their study that the strongest effect on computer self-confidence and attitudes was the additive effect of exposure to computers in school and computer exposure at home. Furthermore, they reported that the effect of computer ownership on computer-related attitude is somewhat greater than the effect of computer use at school. As a result of that, Levin et al. (1998) stated that "Students who own a computer, for example, are more inclined to view the computer as enhancing their ability to perform cognitive and creative activities. They also feel more motivated to become familiar with computers, and feel a stronger need to have computers in their lives" (p.130). Williams et al. (1998) emphasised to this point when they mentioned that providing teachers with access to computers at home will encourage those teachers who are motivated toward ICT to make greater use of ICT in schools, since they have enough time and convenient space which they lack at schools.

It might be expected that access to computers, whether at home or in school, would increase confidence in their use. However the literature reveals that access in educational institutions can be a problem because of large class sizes (Byard, 1995) and where there is access, some studies (Pelgrum and Plomp, 1993; Becker, 1993) suggest it makes little difference to computer use. When students have access to a computer at home, it may significantly increase their knowledge (Geaster and Horridge, 1993) but does not necessarily increase confidence (Blackmore et al. 1992). Thus, the evidence of the effect of computer availability at home or in school is ambiguous. The findings of Smith (1998), Hohensee (1998) Williams et al. (1998) and Levine et al (1998) are different from those of previous studies, perhaps because computer use in recent years has become more efficient, or it might be as suggested, that it is the combined and mutuality-reinforcing effect of computer access both at home and in school that will eventually raise the level of use.

3.5.3. Equipment cost:

Related to the availability of access to computers, some researchers mention the cost of the equipment as an obstacle to using computers efficiently. The expanding uses of technologies in the schools and by teachers have turned the attention to the issue of cost. The cost of any initiative is always an important issue in the educational system for any country. In the USA, for instance the Office of Technology Assessment (1995) estimated the cost of selected telecommunications technologies including teacher training. They estimated that the one time installation cost of a telephone line in all US classrooms may range from $0.08 billion (for one personal computer plus modem per school, connected to the Internet through a school-district-based file server) to $145 billion (to have one personal computer per student desktop, with full of connection to the Internet for a complete suite of text, audio, graphical and video applications). The annual operating costs for the configurations of such programs (including annual training and support for teachers), estimated in the same report, range from $0.16 billion to $11.28 billion.

In a study by Robertson (1998), on the use of technology in teacher preparation, resources in most faculties were found to be adequate, but funding, availability of specific sources and time focus to be barriers to use technology successfully.

Rural districts, according to Bissette, (1998), may face particular problems in technology integration in that budgets for equipment and infrastructure may be limited or non-existent. Interview and observations in her study in New Mexico revealed a need to upgrade district facilities at the elementary level.

3.5.4. Computer knowledge and training obtained:

Enthusiasm and interest certainly affect a teacher's decision to use or to ignore a computer in the classroom. However that is not enough. The teacher's use of the computer depends mainly on the training he/she has received and the computer knowledge he/she has gained.

Rhodes & Cox (1990) in a study among a group of twelve London primary school teachers from 1985-1989 investigated the use of computers with particular emphasis on the influence of teacher training upon uptake. Rhodes & Cox (1990) found in their study, that teacher's acceptance of the value of computers did not lead to regular use. Intensive training was found to be the most effective way to increase teachers' use of computers. Teachers who used computers regularly felt that they were in need of additional and ongoing training on computer use (Rhodes & Cox 1990). Teacher training was found to be a major factor affecting teachers' computer use in schools. They reported that short INSET courses were not enough to promote teachers' uptake and that teachers need ongoing training. The researchers expressed the view that, with courses concentrating up to 97% of the time on technological aspects, teachers would be able to use the resource effectively in the classroom. They reported also that teachers who used computers regularly felt the need for additional training.

Sanders (1992) carried out a study to ascertain the confidence and computer skills of 42 students enrolled in a Post-Graduate Certificate in Education (PGCE) course. Four sets of questionnaires were used to collect data. An open-ended questionnaire was administered at the beginning of the course to assess the confidence and skills of students before enrolling on the course. The second instrument was introduced on the first teaching practice to measure the students' reaction to the course. As a follow up to provision, students were introduced to the third survey. In this instrument, students were asked to indicate what support they felt they needed during the rest of the PGCE year and also what professional development they would be looking for during their probationary year. In the fourth survey, students were asked for information about their first term in teaching.

The results of the first questionnaire revealed that 10% of the population surveyed had never used computers, 29% had used them in schools, 48% at university, 31% had used them in employment and 38% had used computers at home. Some students gave more than one answer. About two thirds of the study population indicated that they felt no confidence at all in personal computer use and 60% felt that they had no confidence at all as teachers using computers. At the end of the first teaching practice, students were asked a series of questions related to the introductory computer course and their first teaching practice. The results indicated an increase in confidence at a personal level and in using computers as teachers. Almost all respondents (92% of the population) reported increased confidence in computer use at the personal level, while 63% reported increased confidence as teachers.

In the third stage of the research, the results showed that 47% of students using computers in their second teaching practice said they had much more confidence. Support from schools was encouraging. More than 81% of the students said they received help whenever they asked for it.

Al-Mohaisin (1993) found that 33% of his science teacher sample called for training. One of the respondents in Al-Mohaisin's study commented "Before we introduce computers into science classrooms we should think carefully about the teachers' training programme" (P. 11-17). Science trainers stressed the importance of training science teachers in how to use computers in the classroom, before asking them to do so.

Bauder and Millick (1993) surveyed 325 teachers near Utica, New York. They found that the most significant factor out of eight for low computer use was that knowledge and computer skills were needed.

Reinen and Plomp (1993) found that teachers could gain computer knowledge and skills either through some kind of training or by means of self-study. The association between teacher participation in training and their computer knowledge was investigated. Significant correlations of .60 for lower secondary education teachers and .57 for upper secondary teachers were found. This indicated that teachers in the two groups were likely to receive part of their knowledge of computers via training. This result prompted Reinen and Plomp (1993) to state:

> "The amount of training received and the type of topics covered in training are to some extent related to the amount of computer integration. A conclusion from

these findings is that a closer look at the types of teacher training is necessary in order to find out how many and which topics should be included" (p. 162).

One of the main problems for teacher not using computers in their teaching is the lack of training. As reported by the USA Office of Technology Assessment (1995), schools in the US for instance revealed that schools in the USA spend much more than 85% in providing hardware and software and spend less than 15% for teacher training. Availability of full- time- school- level computer co-ordinators to help and train teachers to demonstrate computer use in the classroom is short even in the developed countries. The report by the US office of Technology and Assessment (1995) stated that "only 6% of elementary schools and 3% of secondary schools in the USA have a full-time-school computer co-ordinator" (p. 12). This suggests that most teachers may not have on-site access to support and advice to encourage them to use computers in their teaching, or to use them in the most effective way.

Yaghi (1996) found that the three groups (school administrators, computer teachers and teachers of subject matters) that he interviewed considered training all teachers on computer education skills as the most important factor in determining the success of computer education programme. He declared that:

> "The high rating and the absence of significant differences among the three groups express the importance of this issue. The three groups clearly believed that training in the use of computers should involve all teachers, and are not limited to computer teachers. This finding is consistent with a wide international trend found in the literature in support for training all teachers on the use of computers" (p. 145)

This need for teacher training, as explained by Yaghi (1996), arose because of the little or no training that teachers received in their formal education, or it might be as a result of their desire to update their knowledge in the world of fast moving communications technology. Furthermore, the three groups in the study expressed the feeling that all teachers should use computers. However, a significant difference was found between computer teachers and administrators in this matter. Computer teachers and teachers of subject-matter believed that all teachers should use computers either in teaching or as a support tool in lesson preparation, such as grading, record keeping etc., while administrators thought that the use of computers should be limited to those who can make better use of them.

Yaghi (1996) attributed this response to the sensitivity of the administrators working in private schools and not receiving governmental subsidy. He declared that administrators in these schools were too worried about the cost of training all teachers and the cost of machines and facilities needed for full-scale use of computers.

3.6. Summary:

The development and commercialistion of the microcomputer provided a major impetus to the introduction of computers into schools and, throughout the world, increasing amounts of computer equipment are being installed. However, research suggests that a relatively high proportion of teachers skill do not use computers in their teaching, and many pre-service student teachers do not anticipate using them, though the percentages of use reported by studies since the mid- 90s are higher than those reported in studies from the

1980s and early 1990s. Integration of computers into education in Saudi Arabia is still, however, at a very low level.

A major predictor of teachers' take- up of computer technology is their attitude towards computers. It seems that experience and training may contribute in the development of more favourable attitudes toward computers.

Other factors that may affect the use of computers in schools include teachers' perceptions of threat (for example, fear of being replaced by the computer); insufficient, outmoded or poorly located equipment, the high cost of equipment; and the teacher's knowledge and training.

A recurrent theme in this chapter has been the importance of training in computer use and application to teaching. The next chapter, therefore, will explore the issues of computer literacy and the needs of Teacher College students and teachers for computer training.

CHAPTER FOUR

COMPUTER LITERACY AND COMPUTER COMPETENCIES REQUIRED

CHAPTER 4

Computer Literacy

and Competencies Required

4.1 Introduction:

The computer is one of the most important inventions of the twentieth century. All organisations, from the largest to the smallest, in almost every society, now depend on computers to make decisions quickly and accurately. Therefore, the invasion of computers in the current time is regarded as one of the major factors moving society from the Industrial Age to the Information Age, "an age in which the collection, modification and distribution of information becomes a primary enterprise" (Hock, 1989, pp. 5).

To be productive and to participate fully in the Information Age, teachers must become computer literate. Several studies have insisted on the importance of computer technology for teachers in all levels of school (The USA Office of Technology Assessment 1995; Trushell et al.1995; Thomas et al. 1996; Espinoza, 1996; Beck 1997 and Gunter, 1998). However, what does it mean to be computer literate and what do educators expect that teachers should learn and understand about computers and related technology? These issues have been the main targets for many studies during the last decade. Beck (1997) reported that the National Council for Educational Technology (NCET) in the UK suggests that all teachers are able to use the new technologies to improve the process of learning and teaching. Therefore, as Beck comments, the National Council for Education would like to see teachers having a positive attitude toward information technology, understanding its potential, having the ability to use it effectively in their curriculum, being able to manage its use in the classroom, having the ability to evaluate its use and having the technical capability to use it.

In this chapter the definition of computer literacy and the importance of introducing computers to educators are introduced. Attention will be drawn also to teacher preparation and the importance of understanding some computer features and their uses to meet teachers' general needs and specifically in the learning and teaching processes. The basic computer operational skills and the information communications technology proficiencies required for pre-service student teachers and their teachers are also discussed.

4.2. Definition of computer literacy:

As McMillan (1996) noted, the definition of the term computer literacy is confused and poorly articulated, since with computer development and the continuing stream of improvement, the new computer features and capabilities have made the use of computers easier and fewer pre-existing skills are required. Although McMillan recognised that computers are growing rapidly in power, use and flexibility, he expected that sooner or later, operating a computer would be as easy as operating a TV or VCR is now.

These developments, however, do not mean that students do not need to learn specific computer-related skills, though the skills needed may change over time. Certainly, students need to develop practical skills as well as a thorough theoretical understanding of information technology concepts, so they can function effectively in a future of constantly evolving technology (Venter et al. 1996).

So what is the definition of the concept "computer literacy" and what are the skills that constitute "computer literacy"?

Hidgon (1995) points out, definitions of computer literacy have changed since the 1970s. Hidgon recounts how the concept of computer literacy started with the importance of understanding the hardware and software, then moved to programming procedures and knowing about the program coding with BASIC, as the most widespread programming language. The early eighties, however, saw a vast improvement in software development, which changed the focus of computer literacy from programming to application utilisation. Applications such as word processing, spreadsheet and database came first in the business field and then entered the educational process as productivity tools for learning. Definitions for the 1980s reflected these developments, and tended to become more applications oriented. Moreover, they revealed a growing recognition of the social effects of computers; Watt (1980), for example, defined computer literacy as a collection of skills, knowledge, understanding, values and relationships that allow a person to function comfortably as a productive citizen in a computer-oriented society. Anderson et al. (1981) defined computer literacy as "whatever understanding, skills and attitudes one needs to function effectively within a given social role that directly or indirectly involves computers" (pp. 129). That relationship between computer knowledge and skills and social functioning is made explicit by Simonson (1987) who defined computer literacy as "an understanding of computer characteristics, capabilities, and applications, as well as an ability to implement this knowledge in the skilful, productive use of computer applications suitable to individual roles in society"(p. 237). This definition, as Woodrow pointed out, includes four dimensions: computer attitudes, computer applications, computer systems and computer programming.

A similar understanding of the nature of computer literacy is expressed by Hock (1989) who defined it as "the ability to use computer-based tools for writing, communicating and processing data, as well as the ability to evaluate the personal and social consequences of computerisation" (p. 5). Expanding on this definition, Hock argued that for a person to achieve computer literacy three elements were needed: a general understanding of what computers are and what they do, some experience of general computer tools such as word processors and spreadsheet etc., and the ability to evaluate the social issues related to computer technology and the consequences of computerisation. The main differences between this definition and the previous one are the explicit references to specific applications, and the extension of the "social component" of the definition to include evaluation. Thus, it was no longer enough to be able to apply computers in performing a social role; Hock's definition implies recognition that computers might change social roles and that critical awareness of these implications had become an essential component of computer literacy.

The 1990s have seen further developments in the concept of computer literacy specifically in the education context. Fodah (1990) defined computer literacy to fit the needs of college staff in Saudi Arabia as including understanding of the nature of computers (hardware, software and computer terminology), ability to use a computer, understanding of the social and economic impact of computers on society and understanding of the role of computers in education. As regards the latter element, Woodrow (1991) believed that the definition of computer literacy encompasses two distinct concepts: the computer as a classroom tool, and the computer as a subject of instruction.

Hidgon (1995) reflects these uses of computers in education, and the developments that have made them possible, when she declares that, today, computer literacy encompasses enhanced learning across content areas, hypermedia, multimedia and telecommunications.

To sum up, computer literacy (known also as Computer Awareness) is a term widely used but hard to define (Al-Mohaisin 1993). The term "literacy" implies that such knowledge is required for successful functioning in the society (Smith, 1995).

Computer literacy, according to the definitions presented above, implies computer knowledge in general, a concept which has grown from the point of understanding the computer's hardware and software and knowing the parts of computers to the point of infusing computers across the curriculum and throughout all disciplines. Table 4.1. gives a brief summary of the development phases of computer literacy from the 1970s to late 1990s.

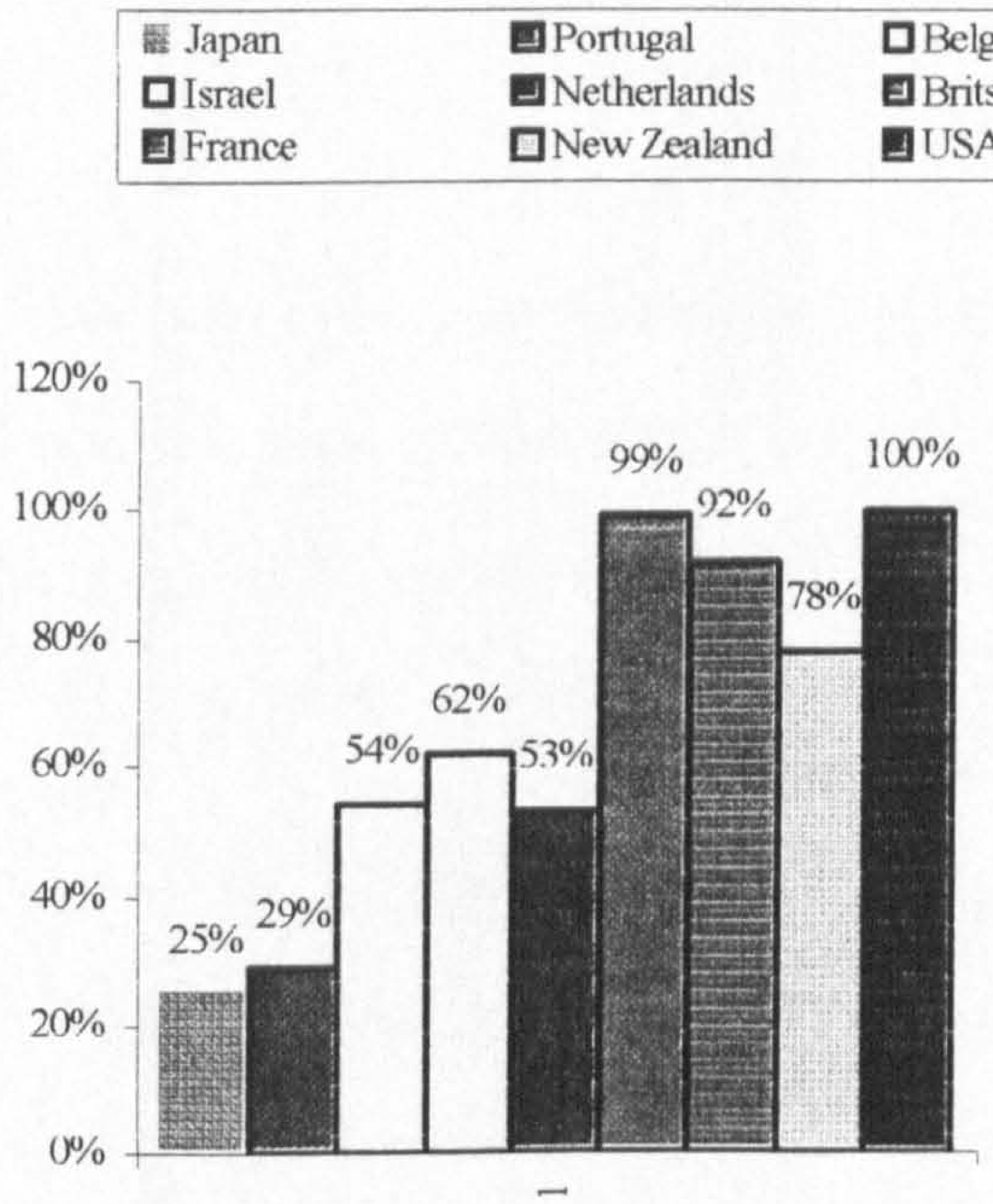
Table 4.1: The development of the skills constituting computer literacy from the 1970s to the late 1990s

Period	Computer literacy skills	References
1970s	**Understanding the computer hardware and software and basic programming**	**Hidgon 1995**
1980s	**Collection of computer knowledge, understanding, values, attitudes and social functioning**	**Watt 1980 & Anderson 1981**
Mid 1980s-1990	**Understanding computer characteristics, use of computer applications in general and specific applications such as word processor, spreadsheet and the use of computer for evaluation. Beginning of integrating computer in the content areas.**	**Simonson (1987), Hock (1989) Diem (1989) Hawkridge et al. (1990), Woodrow (1991) & Hidgon (1995).**
1990s	**Adding to the above the impact of computers on society and understanding the role of computers in education as a classroom tool and as a subject of instruction**	**Fodah,(1990), Woodrow (1991), Smith (1995).**
Late 1990s	**Computer literacy is enhancing learning across content areas, hypermedia, multimedia and telecommunications**	**Hidgon (1995)**

4.3. The importance of computer literacy for educators:

Direct computer implications occur, when computer technology becomes standard equipment not just in every school, but in every classroom in the school and teachers are called upon to possess more sophisticated levels of computer proficiency. Evidence of this computer invasion worldwide is presented by Pelgrum and Plomp (1991), whose study covered nineteen educational systems in eighteen countries. They found that in all these educational systems, computers were installed at levels, which varied from country to country, and from school to school. Figure 4.1 illustrates the availability of access to computer in the elementary schools in some countries.

Figure 4.1: The percentage of elementary schools having computer access, in different countries, as reported by Pelgrum and Plomp (1991)



The study also showed that the median number of computers in the lower and upper secondary schools was higher than in the elementary schools. For lower and upper secondary education in Belgium- French, British Colombia, Federal Republic of Germany, France, Luxembourg, the Netherlands, New Zealand, Switzerland and the USA, between 75% to 100% of schools had access to and used computers for instructional purposes (Pelgrum and Plomp 1991).

Teachers are also indirectly affected by the invasion of computers in other sectors, as they are called upon to prepare students for a future life in which computers are likely to play a significant part. Lauda (1994) reports that 75% of all jobs require some form of information processing, and projects that the proportion will increase to 98% by the year 2000.

Perceptions of the relevance and value of computer literacy to education have, however, changed over time. In the 1970s and early 1980s, when few schools had computers and computer literacy basically meant programming skills, the relevance of computer literacy to teachers was doubted.

According to Hidgon (1995), however, technology in the training of pre-service teachers by the mid eighties had become an important consideration, and many pre-service teachers were becoming efficient in the use of applications programs and in software evaluation, since that was part of their undergraduate courses of study. Nevertheless, understanding computer applications did not lead pre-service teachers to use computers in their teaching as a teaching tool. As Diem (1989) observed, pre-service teachers could learn facts about computers but had little idea how to use them in their particular disciplines. This may have been due to deficiency in the modeling of computers in pre-service method courses (Brewer 1994). It may also be that educators had mixed feelings about technology. While some believed that technology offered opportunities, others saw it as a threat, were terrified of the technology, or mistrusted the motives of those promoting the use of computers in education. For example, McGhan (1988) suggested that most of the talk about computers and schools came from computer companies to gain more money and from educators who were interested in developing new techniques.

From the mid-1980s, however, as computers became an established part of the social world, the focus for educators changed to training pre-service teachers in methods of integrating computers in the content areas, first mathematics and science and later, social science and English. This type of discipline gained in importance by the beginning of the 1990s.

Hawkridge et al. (1990) believed that all students should have courses on "computer awareness", for several reasons. First of all, learning about computers is part of the social rationale. Second, students should be able to operate computers, at least at the basic level, such as using basic computer languages and general computer applications, to prepare them with a foundation for their careers. A third reason is to benefit from the advantages of introducing other subjects, such as Physics or Art through computers. The last reason is that students can be more independent of the teacher's expertise, if they learn facts, handle information and solve problems via computers. Furthermore, they believed that computers encourage collaborative rather than competitive learning. Smith (1995) reported that most of the literature he investigated presumes that educators should acquire some skills in computer technology, to be able to cope with the information age.

This is not to suggest that computers are a panacea, whose use in the classroom will automatically improve education. McCluskey (1994) cautions educators against relying on technology as the ultimate solution for modern education. He suggests "that if educators do so without a concomitant emphasis on knowledge acquisition, some students might be allowed to operate at increasingly lower levels of thought" (p. 551). McCluskey explains that not all students who use a calculator to solve a mathematical problem can recognise the wrong answer when they see it. As a result of that, McCluskey states, "I will be content to conclude that it might be prudent to question the wisdom of relying on increasingly sophisticated technology to remedy the ills facing education today" (p. 551).

McCluskey's comments, however, do not imply that teachers do not need to know about computers or should not use them in teaching. Rather, such concerns increase the need for teachers to know how best and most appropriately to harness the capabilities of computers to promote the desired learning outcomes. As Kozma (1994) commented:

> "How this new technology will be used is not yet clear. But enabled by its capabilities, ... designers may find new ways to engage students in interactions...that may tip the balance in favour of learning" (p. 18).

That this is, in fact, happening is suggested by Hidgon (1995) who notes that with the availability of hypermedia for education such as HyperCard, Linkway, and Toolbook it is easier for pre-service teachers to learn to develop software targeted for a specific content. The involvement of telecommunications and multimedia in education adds another dimension for computer literacy for pre-service teachers and will be the next step in the computer literacy evolution, which will never come to an end.

The two aspects of computer literacy for educators, namely, computer as a subject and computer as a classroom tool, are bridged by Westermeier (1998) who, in a study of the computer skills of teachers in a large urban school district in California, found a significant correlation between teachers' level of computer literacy and the amount of time their students used computers. The large majority of teachers were keen to use computers with students to prepare them for careers, or because their educational philosophy influenced them to use computers with students, and they wanted training to help them to do this.

Teacher preparation institutions, as social organisations, are affected directly and indirectly by the computer invasion. Recognizing the need for teachers to be able, both to use computers as an educational tool and to equip their pupils for life in a computarised society, they are attempting to equip pre-service teachers with such skills as the ability to locate information, select appropriate applications and software, organise material sequentially and assess the relevance of information. Moreover, understanding what computer technology is able to achieve, how it can enhance student understanding, simplify the teaching work load and provide enjoyment are also part of the teacher preparation focus (Rosen, 1995; Espinoza, 1996).

4.4. Computer knowledge and training needs:

The changing perception of what computer literacy means (section 4.2) and what skills it encompasses (section 4.3.) have been reflected in studies concerned with computer knowledge and training needs.

Milner (1981) outlined the training needs of teachers as they existed in 1981. Computer assisted instruction required training in instructional design, computer-based learning materials, programming, and computer uses in education. Teachers of computer science and data processing, and teachers of computer in relation to society, required training in programming, hardware and software organisation, and computer and society. However, Milner addressed only the needs of computer science teachers; he did not identify training needs related to the wider use of computers as a classroom tool or as a medium for the delivery of subject matter.

These other uses of computers in education, although in their infancy, were, however, recognised by Spivak and Varden (1981), who identified two categories of computer use beyond the computer science focus, for which teachers would need training. The first involved using computers as instructors: drill and practice, tutorials, inquiry, games, simulation, creative writing, and graphics. The second was the use of the computer as a teacher's tool: testing (construction, scoring, and analysis), record keeping, text processing.

Programming was at this time a major part of computer users' requisite skills. BASIC was the most widespread programming language taught to students of the computer. This knowledge was rudimentary until application programs were developed which allowed computer users to work on the computer without first constructing a program to make the computer perform whatever function was needed. The late seventies and early eighties, however, saw a vast improvement in software development, which gradually changed the focus of computer users from programming to application utilisation (Dershimer &Dershimer 1991). Personal computers and software for management purposes were developed from the early 1980s, became widespread in business and subsequently emerged on the educational scene as productivity tools for the learning process. The applications available were word processing, database application programs, and spreadsheets. Using a computer for these kinds of activities became practical for classroom teachers with the invention of the microcomputer, adding a new dimension to their training needs.

Respondents in Fodah's study (1990) were given a list of computer topics to rate their needs. The results in sequence, from highest to lowest were: Student diagnosis, Problem solving, Student evaluation, Administrative work, Software selection, Drill and practice, Processing information, Programming, Computers and society and the History of computers. Respondents in her study were also given a list of applications and they were asked to rate in order their priorities for a computer workshop. The list contained word processing, spreadsheet, accounting, record keeping, instructional programs and database. The results revealed that Instructional programs, spreadsheets and record keeping were the most popular topics for respondents.

In the Comped study, which was reported by Reinen and Plomp (1993), questions about the computer- related topics covered during the teacher initial and in-service training were included. Listed topics within five main categories were introduced to teachers. One of the categories was about computers and society with 4 topics; another one was about applications with 14 topics. The third one was about problem analysis and programming, the fourth about principles of hardware and software structure and the last category was about pedagogical/ instructional aspects. When respondents were asked to indicate which computer related topics were taught in their subject matters class, the first four categories given in the last question were given: computers and society, applications, problem analysis and programming and principles of hardware and software structure. The results indicated that the majority of computer topics, which were covered in the lessons in the subject matter classes, were also included in the training teachers received.

Attempts have recently been made to establish empirically the content validity of computer literacy courses at the school level through a reliable measure. Welch and Anderson (1994) investigated the word processing abilities of a large sample of students. They found students to have an acceptable level of performance in basic word processing techniques, meaning that school students were capable of handling these skills. Clements and Carifio (1995) carried out content analysis of fifteen textbooks and pertinent documents used to teach computer literacy in the U.S. for the purpose of "establishing what skills were common to these sources" (pp. 20). They regarded word processing, spreadsheet, and database management as the fundamentals of computer literacy.

Whilst a number of studies have identified needs for computer knowledge and training, and have suggested topics or skills that should form part of that training, a recent study by Blankenship (1998) makes a new point that is particularly interesting in relation to the training needs of teachers. Blankenship (1998), by means of a combination of quantitative survey and qualitative investigation using focus groups, sought to create a prioritised list of strategies to improve teacher use of computers in public schools in Carroll County, Virginia. He found training to be the most common predictor of computer use but emphasised that training must be targeted to grade level and curriculum area to be effective. In other words, training needs include strategies for using computers with particular ages and ability levels and in specific subjects; general training on applications is not enough to enable teachers to use computers effectively in teaching.

4.5. What teachers and learners need to know about the use of computers:

Microcomputers have been in schools for about two decades, during which certain points about their use in education have become clear. They can assist in directly instructing students, keep track of and manage effectively some aspects of the educational process, model many parts of the ways the world works and thereby provide simulations that can lead to new levels of understanding. However, this limited use requires close teacher involvement and monitoring, because management functions can easily become an end in themselves rather than a means to improve instruction. Moreover, all models must be understood in close relationship to their real world counterparts; otherwise, a false understanding will be produced, not real understanding (Somekh, et al. 1997). A set of powerful educational tools can be provided by microcomputers. At their best, these tools are not single, one-dimensional tools, but multifunctional, multidimensional tools, which give people better mental leverage to think about things.

Maier et al. (1998) mentioned that computers can be used in a wide variety of ways in education, and different applications have been introduced via the new hardware and software. They suggested that computers in education could deal with three different dimensions, each of which is very valuable and important for teachers and learners, since they are the key to what is being called life-long learning. These dimensions are:

1) Basic computer operation proficiencies, such as understanding the function of the various components of the computer and the use of a variety of software including word processing, spreadsheet, databases and commercially prepared programs such as drill and the use of the computer as instructor;

2) Computer as a resource for communications tools to aid learning and teaching;

3) Computer as a tool for interactive presentations for teaching curriculum subject matter.

Each of these three categories is discussed in the coming review.

4.5.1. <u>Basic computer operating proficiencies:</u>

Even though considerable attention has been addressed to distinguish between teachers and students' computer knowledge needs, there are some basic proficiencies desirable for all teachers and students. These proficiencies should be part of the training of all teachers, either through direct teaching programmes or through in-service remedial systems. Most studies insist on the importance of understanding the functions of the various components of the computer and acquiring the competence in using common productivity tools such as word processing, spreadsheet and database. Also within the category of basic operating proficiencies are the use of multimedia and Computer Assisted Learning.

4.5.1.1. Productivity tools as part of basic computer operating proficiencies:

The use of word processing systems with the many features they have in writing programs has been claimed to lead to better writing outcomes, such as longer written samples, greater variety of word usage, different sentence structure, more accurate mechanics and spelling, better understanding of the writing process, better attitudes toward writing (Cotton 1991). Cochrane (1991), in a review of research on word processing, reported that a number of studies have shown that the introduction of word processing into instructional programmes is able to affect positively the quality of writing output. Word processing has also been identified as a particular useful aid for teachers. One of the biology teachers in Barnard's study (1998), commenting on word processing, said:

> "Computers have revolutionised production of handouts, tests, assignments, homework, class lists etc. The word processor has changed my life far more than anything else to date" (p.4).

The utility of word-processing for a variety of purposes has made it a popular and widely used productivity tool with which more and more people are becoming familiar.

Pre-service teachers in Byrum et al.'s study (1993) perceived their level of preparedness for using productivity tools in the classroom as fairly high, and they showed the greatest level of comfort with word processing at 89%.

Maier, et al. (1998) found that 88% of the staff in the Southampton University could use a word processor, and they thought also that the proportion of users is likely to rise over time. They also believed that students need to learn to use a word-processing package to lay out their own work in a professional way.

Another useful productivity tool is the Spreadsheet, a program to provide flexibility, convenience and power for dealing with numerical work.

Hirumi (1996) believed that a spreadsheet is one of the most exciting and challenging computerised applications and the appropriate tool to help students to calculate relationships among many categorised bits of information.

Although the spreadsheet software can play a major role in classes where numerical activities are applied, such as mathematics, science, accounting and business management, other classes in the social sciences can benefit from this application too (Hirumi, 1996). For example, spreadsheets are useful if a student wishes to draw conclusions about the agricultural production or natural resources of an area of a country. Spreadsheets are also advantageous for teaching management science, especially, since most managers in the businesses area now recognise that spreadsheet skills are desirable in recruits. In business spreadsheets are seen as the most powerful calculator and rely on it as a platform for powerful end user models for making important decisions (Powell, 1997).

The other common computer application, which is frequently cited in the literature as one of the core components of computer literacy is database management.

Database management systems consist of the software for controlling, reading, and updating information in a collection of files. These files consist of quantities of data in forms where they can be retrieved, searched and ordered with ease.

The term database is defined by Benyon (1990) as " a collection of data organised and integrated for some purpose" (p. 10). He added that, a database is an integrated and structured as opposed to a random collection of separate pieces of data, used by a variety of people for a variety of uses, some of which will not have been anticipated during the design of the database. Vandergoot (1996) believed that databases have many purposes, but most importantly, a database makes sorting information painless.

The database, as Benyon (1990) suggested, must support unanticipated uses by allowing new inquiries and reports to be made.

Even though databases are quite time consuming to develop, the resulting benefits are numerous, since they place information at the user's finger tips and remove the lengthy process of filing information. In addition to that, more than one person can have access to information and can process data at the same time.

In database management systems, the data is centralised, controlled and independent, the quality of the data is enhanced, duplication of data is eliminated and there is a great possibility for security enforcement. Despite all these advantages of database management systems, there are a few disadvantages, such as the problems which are usually associated with centralisation, cost of hardware, software, changes and complexity of backup and recovery (Vandergoot, 1996).

The database management system used to have an administrator to lay out the structure of the software. However, to help avoid the need for a program and database administrator, software developers invented a whole new generation of software called files management software, or a file manager. This file consists of several programs managing the data stored in a single file. The main role of the file manager, which emerged in the 1970s, is to set up the data file, enter and edit the data in the file and print reports from the file (Hock 1989).

Al-Mohaisin (1993) suggested that the ability of database to retrieve information quickly according to many criteria, which its user can modify at will, is a powerful tool which teaching staff and students should learn in their computer literacy course as early as possible. He added also that a database could be used as a powerful vehicle in teaching various subject matters such as History, Geography and Science, or it could, at least, act as a teaching aid.

Although the three tools mentioned here –word processing, spreadsheet and database- are all cited as basic operating skills, it seems that they are not all equally known or used by teachers. Byard (1995) found that preparedness of pre-service teachers for using productivity tools such as database, spreadsheets and drill and practice was at a high level; 71% for database, 67% for spreadsheets and 91% for using drill and practice software in the classroom. McCoy (1998), however, found less consistency in proficiency. She reported that instructors are proficient at using word processor, and online communication, but that there are more needs for information management and problem solving applications, including spreadsheet; database and graphics.

A similar situation was uncovered by Dawson (1998), who sought to identify instructional uses of computers by 1298 elementary school teachers, to develop recommendations for in-service teacher preparation within the district in Southern Virginia, USA. The results regarding training for computer skills revealed that most formal training was on word processing and the least formal training on computerized gradebooks. Half the respondents reported never learning how to use databases, gradebooks and spreadsheets, while over half of the teachers reported that they learned classroom organisational skills related to technology via personal trial- and- error.

There are, however, those who doubt teachers' need for training in spreadsheet and database, though this depends on subject area. Adams (1998), for example, believes that activities of teacher training should be restricted to applications centered around text rather than others, such as databases and spreadsheets and expresses the view that, for example, teachers of modern foreign languages have no great need to be trained in the use of a spreadsheet or database.

4.5.1.2. Multimedia as part of basic computer operating proficiencies:

The multimedia can be anything from a computer to a full-fledged program utilising interactive hypermedia, video, sound, and online telecommunications (Hidgon, 1995).

Multimedia can be used in any situation where computers are being used to deliver information, including enhancing areas that were previously text only. It is said that multimedia allows information to be communicated better and more collaboratively as the working tools are cheaper and more widely available (Cunningham, 1994). Ever since computers began to be sold as "multimedia" systems, there have been suggestions that they could be successful teaching tools (Hidgon 1995). According to Cunningham (1994) multimedia can enhance the distribution of distance learning through the use of electronic communications and the transfer of images and text.

Bork (1998) suggested that highly interactive multimedia learning units allow major improvements in learning, working even with very large numbers of students.

Bronkhorst (1998) suggested that several effects of multimedia use on students' learning and teaching decisions. He reported that students working with multimedia materials ask more and higher level questions, develop a comprehensive view of teaching issues and problems much earlier than students not using multimedia, assume multiple roles in a discussion and elaborate on each others' contributions. Information is retained for a much longer period of time, and students have a remarkable attitude to use of multiple sources, including seeking support amongst many participants in newsgroups and mailing lists. Students in their practicum settings used the multimedia cases to guide their teaching (Bronkhorst, 1998).

Teachers will, however, need to develop new skills to prepare materials for electronic study. Respondents in McCoy's study (1998) emphasised great need for opportunities for pre-service teachers to learn about multimedia and how to use it to support student-centred learning to be able to integrate technology successfully into their teaching. Moreover, there are time implications to the introduction of such technology into education. In the U.K., for instance, the Committee of Vice Chancellors and Principals (1996) estimates that producing materials in multimedia form takes twice as long as more as conventional methods; such materials require regular updating to take account of new developments; and even without updating it would, on average, take six years before the initial time investment is recouped.

4.5.1.3. Computer aided learning as part of basic computer operating proficiencies:

The use of computers to teach falls generally under the heading, computer assisted instruction. Cotton (1991) defines this type of courseware as a narrower term, which most often refers to drill-and-practice, tutorial, or simulation activities offered either by themselves or as supplements to traditional teacher instruction.

* Drill and Practice:

Drill and practice programs are usually used to reinforce old lessons rather than teach new ones (Hock 1989). A wide variety of drill and practice programs are available for different levels of study to give students different ways of practising things they have already learned, with feedback to reinforce their learning. Drill and practice packages are mostly based on question and answer interaction or may use games. Trevitt (1995) believed that drill and practice sessions work better if they incorporate a challenge, an element of chance and immediate feedback. There should also be provision for progression if a student becomes stuck. Byrum et al. (1993) reported that 44% of pre-service teachers in their study cited drill and practice as the software they were most comfortable using in the classroom.

* Tutorial:

Tutorials are programmes used to teach new concepts and processes actively by presenting material to the students in a structured format (Rist et al. 1997). Tutorial software usually incorporates work examples, and encourages learners to assess their understanding by adding questions, answers and immediate feedback.

Hock (1989) described the machine in the tutorial programmes as the lecturer and the student as a passive listener.

Byrum et al. (1993) found that 67% of the pre-service teachers they surveyed believed that well designed tutorial software could present instructions as well as a teacher.

* Simulations:

Simulations are programs usually used to mimic the principles, causes and effects found in reality. They are based on interactive graphics and give the learner the ability to visualise a process and explore the effect of changing parameters on the operation of the system (Rist et al. 1997). The context of the simulation may contain a business plan, a laboratory experiment or an animation of the working of a chemical plant. Clayson et al. (1997) compared the student perceptions of two marketing strategy sections, one taught traditionally and one with a computer stimulation. The results revealed significant differences in the benefits that the students believed they had received from the two sections. Students in the stimulation section believed that they liked the class more, learned more skills and felt that the stimulation class would be more valuable after graduation for them from their colleagues in the traditional class.

All three types of computer assisted learning packages, then, appear to be valuable components of teaching. Cotton (1991), based on a review of studies of the use of computers to aid instruction summaries the reported benefits thus:

1) Higher achievement was produced via the use of computer aided instruction application than via conventional instruction.

2) Materials were learned and retained faster with the use of computer than with learning via conventional instruction.

3) Learning via the use of computers encourages a more positive attitude toward computers, course content, quality of instruction and the school in general, than learning only with the use of conventional instruction.

4) Younger students realise more benefit from learning with the use of computers than older students.

5) Most disabled students, including handicapped students with hearing problems, mentally retarded, emotional disturbed and those with language disorder, learned better with the use of computers than with the use of conventional instruction alone.

According to evidence based on this review, Cotton (1991) supported the encouragement of computer- based instruction and implementing further programmes in teaching.

In Barnard's (1998) study, all interviewee groups showed an enthusiasm for computer assisted learning program packages and their usefulness, although they emphasised that the utility of such programs depends on the extent to which they met syllabus requirements and in the quality of information they contain. Barnard thought that this impression is negotiable to some extent, and it depends on the individual's philosophies and the educational philosophies implicit in the program. In any case, it can be suggested that the evidence in favour of computer assisted learning packages is sufficiently strong to justify their being considered a useful part of the teacher's "tool-kit".

Teachers who are comfortable using such applications have a wider range of alternatives at their disposable from which to select, in order to enhance teaching and learning.

4.5.2. Computer as a medium of communication for learning and teaching:

The service of the Internet is available in all higher education establishments almost all over the world and educators can be connected to the Internet, which has been described by Sangster (1995a) as "the library in the desktop, the dictionary at the fingertips and the sound at the ear", (pp. 1).

Even if teachers do not make active use of the Internet in their teaching, they need to be capable of using it as researchers; not only to update and refresh their knowledge, but to be able to answer questions that their students raise from materials they have found on the web (Sangster, 1995b). Dow, et al. (1996) believed that over the next decade, the on-line environment for students and teachers can expect to receive a high proportion of professional and personal communications in digital form. Therefore, they stress the importance of including the Internet in the education of pre-service teachers.

Various communications tools are now available to integrate computers into the teaching and learning process. Electronic mail, computer conferencing and the World Wide Web are good examples of such facilities.

4.5.2.1. Communication resources: Electronic mail:

When the computer is a medium for communication, electronic mail (e-mail) is used. In this mode the Internet can be used to communicate on either a one to one or a one to many basis. E-mail can be used in communicating with colleagues, students and any other people who have e-mail facilities (Dow et al. 1996). E-mail also offers the advantage of broadcasting to a group as opposed to communicating with a single person (Maier et al., 1998).

A further development of electronic mail technology is Mailbase, which was described by Gold (1995) as a service which runs electronic discussion lists for the UK higher education and research community. A discussion list consists of a group of people sharing a common interest and running via a Web page.

Electronic mail technology has a number of potential uses in the educational context. Beside the possibility of using e-mail as a device for conveying messages, it can also be used to operate class-wide support, administer assignments, facilitate access to tutors and develop computer confidence (Sangster, 1995b). Moreover, students can send any query relating to material they are studying, and answers to questions asked by learners can be circulated to all students in a class instantly, irrespective whether tutor or students are at class, at home or at any other place. As a result, many problems can be solved more effectively via e-mail and students' performance enhanced when an e-mail forum exists (Sangster, 1995b).

Cooper (1996) reported that through the use of e-mail as medium of communication in a mathematics course, she gained a more expressive insight into her students' concerns and learning experiences. She found that when students needed any help from their teacher they directly sent her an e-mail, since they knew that immediate feedback would be received. She noticed also that students using e-mail did not need to wait to express their direct reaction to the course, since they already knew that their message would be directed to her.

Bronkhorst (1998) reported research on children's use of e-mail, which revealed that children who used e-mail accepted each others' answers coming by e-mail better than those of teachers and experts, could provide information to each other via e-mail very well, collaborated easily at a distance and learned how to give and respond to criticism.

Evidently, integrating e-mail into the process of teaching and learning is beneficial for both teacher and learners and saves time and effort. However, it has obvious resourcing and training implications. For a teacher to use any electronic communications in his/her teaching regularly, he/she will need to have a computer able to receive e-mail, and be competent in using it. Similarly, if a teacher is to communicate with his/her students via e-mail, computer facilities must be available for students and their ability to use such services should be checked. Thus, teachers will need to know not only how to use electronic mail facilities themselves, but also how to teach students to use them. Moreover, if e-mail is going to be used as a mode of participation in a teaching course and integration is to take place, learners should be aware of how they will be expected to participate and the mode of operation of the course should be explained to them.

Teachers should also be aware of the social implications of the new technology, for example, confidentiality and security issues. Since the Internet is not a secure transmission system, learners might object to giving their personal details such as address and phone number in a distribution list. To overcome this problem, a closed user- group might be established to effectively limit access to electronic mail to learners in a course only and to enable them to interact with each other with more privacy and with sufficient security.

As this example illustrates, teachers who are aware of the social impact of the computer, and sufficiently competent and confident to use it flexibly, will obviously be better able to harness the capability of electronic mail technology to their own benefit and that of their pupils.

4.5.2.2. Communication resources: Computer conferences:

Using e-mail for the discussion of topics can be confusing, since many contributions can be made simultaneously. Special software called "Hypermail" can be used to structure contributions to make them more comprehensible, according to Maier et al. (1998):

> "Hypermail is software which is used to structure e-mail discussion in this way (subject/ author/ date). E-mail massages sent to a special e-mail address are periodically converted into a mail archive, which is in HTML format and can be browsed by all interested parties (subject to access controls) as a World Wide Web document. The Hypermail software runs on a variety of Unix platforms and is available free of charge for non-commercial use" (pp. 120).

The course information and messages of the computer conferencing software are usually located on a central computer known as a server. Participants are connected to the server automatically when they log on to the system and have the right to access information, download this information to their personal computer or upload any messages and information to the server, to be seen by others. Computer conferencing is ideal for co-operative learning, where students take some of their learning, working together to produce a joint product rather than competing and regurgitating facts presented by the lecturer or books (Maier et al. 1998). Daniel (1997) favoured students having freedom to set up their own conferences and predicted that hundreds of them would be set up to reflect the huge range of interests and hobbies as well as the increased interest in the world-wide International Baccalaureate. However, based on his experience with the Open University in the UK, he believed that curriculum- related conferences need a teacher moderator in order to ensure purposeful goal- directed activity.

Such technologies as computer conferencing (which may include audio and video components) have significant implications for teachers, because not only do teachers have to be familiarised with the use of the technology, and learn how to manage electronic groups (Maier, et al., 1998) but also a rethinking of teaching strategies and values may be needed (Daniel, 1997). New roles for the teacher, as moderator and facilitator, rather than instructor, are implied, and teachers will need training to understand and implement these roles.

4.5.2.3. Communications resources: the World Wide Web:

The World Wide Web (www) is based on the relationship between two complementary software applications. One is referred to as the *client* who issues commands and the other is the *server* where commands are executed. A large proportion of all software that is distributed over the Internet is downloaded from computers through a File Transfer Protocol (FTP) server. Files sent over the Internet are split up into data packets, which have various routes through the network. Every computer linked to the Internet has its own unique address, referred to as its IP address.

With the widespread use of the World Wide Web and ease of navigating the World Wide Web in recent years, the use of the Internet has expanded exponentially. Although Johnson (1996) believed that no one can be quite sure about the number of Internet users, Garland (1998) estimated that the number has increased rapidly from a few millions in 1990 to more than 50 million in 1998.

Forsyth (1998) suggested that in the near future, the development of the Internet in general and specifically in educational matters is not difficult to predict. He suggested that some computer programs are already taking over the major teaching role. He gave some examples of these programs offered in the USA such as "Super Mario Brothers" in mathematics and science, "Carmen Miranda" for geography, and programs from "Sesame Street" for languages at the elementary level. Forsyth considered the interaction between the learner and what he/she is attempting to learn as one of the main characteristics of network delivery learning. He reported that behaviourists, cognitivists and those who see education as a construct believe that interaction is one of the higher order levels of feedback and that feedback in general is an essential feature of education (Forsyth, 1998).

Schutte (1997) compared the responses of students in a traditional face-to-face traditional Social Statistics course at California State University with teaching through the use of the World Wide Web. Students were similar in their demographic characteristics and exposed to two mid-term and final term examinations using identical tests for the two groups. The results revealed that students taught through WWW scored an average of 20 points higher in the 100-point midterm and final exams. Students who learned through WWW differed significantly from their colleagues who were taught face to face in the degree of interaction with fellow students, time spent on the class, perceived degree of flexibility and understanding of the material and feelings of affect toward instructor, the class, computers and mathematics. Schutte (1997) found, however, that at times virtual students seemed more frustrated by the technology, especially when they were unable to ask the instructor questions when they needed to.

Teachers may wish to use the WWW in a variety of ways and teacher training would need to consider the purposes to which teachers will be putting their computer skills. Possible uses of the WWW include creation of a personal home page, detailing course times and changes, recording lists and so on; publishing lecture notes and handouts, which can be simply output from word- processors and converted using standard HTML conversion tools; designing courseware unique to the web; and assessment (Sangster, 1995b). Therefore, it seems that for all teachers, a basic level of familiarity with WWW is becoming a necessary competency.

4.5.3. Computer as a tool for integrating subject teaching:

Increasingly, in developed countries at least, teacher training is highlighting the importance to educators of computer skills, and teachers are encouraged to integrate computers into their teaching of a wide range of subjects. Nevertheless, the evidence suggests that integration in practice is still low.

The USA Office of Technology Assessment (1995) found that, even though all but seven states reported that they required or recommended integrating computers or information technology into the curriculum, and 19 states required seniors to demonstrate computer competence before graduating, only 9% of secondary school students reported using computers in English lessons, 6- to 7% in maths and 3% in social studies.

It seems that a major reason for this low level of integration is lack of confidence on the part of teachers. Byrum (1993) reported that a national survey of education majors, run by the U.S. Congress in 1988, found that only 29% of the teachers felt prepared to teach with computers. Similarly, a recent survey by the U.S. government's National Center for Education Statistics showed that only a fifth of teachers in the U.S.A. feel confident about working with new technology in the classroom (BBC Online News, 1999b). These results worried the Education Secretary, Richard Riley, who noted that these results revealed a "dramatic need to get serious about better preparing for and supporting teachers in our classroom" (BBC News, 1999b).

The Chief Executive of the British Educational Communications and Technology Agency expressed similar concerns, when he talked to the audience at the British Education and Training Technology exhibition in London. He said, "A significant proportion of our teachers lack an appropriate capability for information communication technology use. We have not ensured that they themselves are capable users of ICT... it underlines the need for continuous investment in our teachers' capabilities as new technology emerges" (BBC News, 1999a). If this is the situation for the use of technology in developed countries, then the situation in the developing countries is likely to be even worse.

If technology is to be integrated into the educational curriculum, it is necessary to provide training for those who ultimately use the technology. Training courses for pre-service teachers in classroom uses of computers are now either compulsory or available as electives in the programmes of most schools of education. Equally important, however, are the beliefs and perceptions about computers in education that these future teachers take from their training.

Although, today, many schools of education in developed countries offer specific computer courses to train their students in how to integrate computers into their education curricula, Byrum (1993) believed that training is still inadequate to prepare teachers to use computers in their teaching, as suggested by the survey by the USA Office of Technology Assessment (1995) referred to above (p.3.37)

However, it may not be only the amount of money invested in training, or the amount of training provided, that is at fault. The type of training may be inappropriate.

Thomas et al. (1996) found that students did not value training not connected to subject matter or immediate instructional purpose. They mentioned that for preparing students in technology use many teacher education institutions attempt to offer separate courses focusing on technology. These courses are mostly introductory courses or emphasise the computer skills needed for their student teachers to use them as a tool for learning and teaching. However, Thomas et al. (1996) recommend that the appropriate way of introducing optimal technology experience for pre-service student teachers is to incorporate the use of technology into all or most education courses using infusion models. Situating technology use in the educational courses as an instructional resource, not only as a tool for teaching, may serve to develop the students' technology skills and knowledge relating to the subject matter instead of looking at computer skills as a separate and autonomous element. Thomas et al. (1996) emphasised the importance of co-operation between student teachers in technology learning and specifically that they should share classroom applications and experience with each other.

As the foregoing discussion indicates, the integration of computers in education is a complex issue, which needs to be addressed on several levels. As McCoy (1998) points out, for technology to be integrated into teacher preparation programmes, there must be a systematic effort which includes collaboration among administrators, faculty, support personnel and students. Teacher educators need much support from their university or colleges to shift from the use of computers for personal productivity to integrating technology into their instruction.

Then, perhaps, teachers of the future may leave their training with sufficient confidence and capability to infuse technology into their own teaching in schools.

4.6. Summary:

This chapter has defined computer literacy and identified the range of computer-related topics that might be considered to fall within the field of computer literacy for educators.

Although definitions vary, there is a consensus that computer literacy encompasses the ability to use computers for a variety of purposes, an understanding of their social role, and the ability of infuse computers into subject matter teaching.

Whilst some educators have doubted the value of computers in education, or felt threatened by them, increasingly computer skills are considered necessary for teachers. It is argued that teachers must be computer literate because computers are part of the society, students will need them in their careers, they can enhance subject teaching, and they encourage students participation and autonomy in learning.

Computer proficiencies needed by educators fall into three broad areas. First, there are basic operating proficiencies. These include familiarity with productivity tools such as word processing, spreadsheets, and database management; multimedia; and computer assisted learning applications such as drill and practice, simulations and tutorials. Secondly, teachers need to know how to use the computers as a communications resource. This might include the use of e-mail and mailbase for conveying messages and providing support; computer conferencing; and use of the World Wide Web, not only in teaching, but also for research purposes. Thirdly, teachers need to understand how computers can be used to enhance the teaching of subject matters. Courses in this area are compulsory in some teacher preparation systems and available as an elective in others, but levels of computer infusion in subject matters remain low. Calls have been made by researchers for teachers to receive more training in those areas, and for mutual support and sharing of experience by educators.

CHAPTER FIVE
RESEARCH METHODOLOGY

CHAPTER 5

Research Methodology

5.1. Introduction:

It has been asserted by educationalists, in recent years, that the training in computers in Teacher Colleges (TC) in Saudi Arabia (SA) does not encourage student teachers to use them properly and that a problem of inadequate training in computer use exists in all teacher preparation institutions in SA (Al-Mohaisin, 1993). However, TCs have recognised this problem and a remedial plan has been introduced to add a computer literacy course to the education curriculum. The Deputy Minister of the Ministry of Education for Teacher Colleges told the researcher in interview that a compulsory computer course had been added to the College curriculum to ensure that students were literate in computer use. He added, " It is very important for student teachers in Teacher Colleges to be aware of the use of technology during their training at the colleges. We are now living in what is called the information age and it is very essential for everyone to be familiar with these technologies or at least with the minimum use of them".

To make these courses as effective as possible, it is essential for the planners in these colleges to be aware of two sides of the problem. One side relates to the TCs' students, their experience, the computer knowledge and skills that they have, the computer training they feel that they need and their attitudes toward computers in general and their utilisation of them in the future. The other side of the problem is related to the TCs' teachers and the experiences that they have in computer use, their level of knowledge, their computer training needs, their feelings about computers and their utilisation of computers for themselves and for their student teachers. This chapter explains the approach adopted in this study, to gathering that information.

5.2. Objectives and aims of the study:

The main aims of this study were to examine the current status of TC students and teachers' experience of computers, their knowledge and skills, their computer training needs and finally their attitude toward computers and their utilisation of them. This investigation was carried out to determine the extent and nature of the problem of computer literacy in Teachers' Colleges in SA and to suggest possible solutions to increase computer awareness among these people. Specific objectives, which were set out in detail in the first chapter, can be summarised as follows:

1) To investigate the current computer experience of TC teaching staff and students, computer use, type of computer training they received, familiarity with computer languages and computer applications; availability of access to computers, the purpose of computer use and the average hours spent working on computers;

2) To highlight the ways that this experience of computer use had been obtained, i.e. sources of learning about computers;

3) To assess the computer knowledge that TC teaching staff and students in SA have;

4) To investigate the computer training needs of teaching staff (TS) and students in TCs as perceived by them;

5) To investigate the TC teaching staff and students' attitudes and feelings toward computers and their expectations of computer utilisation in the future;

6) To identify the availability of the human and physical resources for appropriate information and communications technology training.

7) To suggest solutions and recommendations which might help the decision-makers to build up strategies for implementing information and communications technology course modules in TCs in SA to improve TS and students' computer skills, knowledge and uses.

5.3. Research design:

To achieve these objectives, several procedures were used. Questionnaires were distributed to the two sample groups, TS and students. Selective interviewing was carried out of relevant officials (in the Ministry of Education, in Teachers' Colleges and in the Educational Districts) who are concerned with teacher training. Previous literature upon the subject was reviewed.

The use of multiple methods was adopted because it is widely recognized that using more than one approach in collecting data will help the researcher to tap the strengths of each of these data sources and overcome the weakness which could result from using only one single method (Paton, 1990). Van Daline et al. (1979) mentioned that a single method of obtaining data, such as a questionnaire, might not address every problem that arises in the research; several instruments and approaches might need to be applied to solve the complexity of human problems. Opinions, experience, beliefs, knowledge and training need to be researched in different ways, since these elements, as expected, differ from one person to another. As a result of that, qualitative and quantitative methodologies were used to answer the research questions. Questionnaire surveys were distributed as a quantitative approach, and in-depth interviews were conducted as a qualitative approach.

This combination of approaches in line with the comments of Gall et al. (1996), regarding the extensive use of questionnaires and interviews in educational research which typically inquires about the feelings, attitudes, accomplishments and experience of individuals. They stated that: "A wide range of educational problems can be investigated with questionnaire and interview, as illustrated by their use in the recent studies" (p. 288).

5.4 The Questionnaire:

For the findings of this investigation to be generalisable to the whole target population of TCs in SA, a large sample needed to be involved. Therefore, it was decided that a questionnaire survey was appropriate. As Thomas (1978) declared, the most popular form of investigation when a large sample is involved is a questionnaire consisting of groups of items, each of which is designed to measure part of the problem under investigation. Every item belongs to a scale, which provides a means of quantifying respondents' views. Each person expresses his or her agreement or disagreement with a given statement, and these expressions are translated into a numerical value for each statement.

For the following study, since much of the information was sought from a large sample of population, a questionnaire was considered an appropriate method by which to obtain data about the computer experience, knowledge and attitudes of TC teachers and students in SA.

Suitable instruments were sought according to a previous informal meeting with some teacher college students and teaching staff held by the researcher during his work in Taif Teacher College. Interviewees expressed a great lack of computer experience and computer use. For example, most TS were found to have had no experience in computers and they did not make any effort to work with computers or to familiarise themselves with them.

Unfortunately, most previous studies in the field had been focused on measuring the attitude of students or teachers with some computer knowledge, or of professionals (Al-Mohaisin 1993). Moore (1984) noted that the studies of Lichtman (1979), Clement (1981), Miller (1981), Jay (1981), and Lawton and Gerschner (1982) were all designed to measure the attitude of teachers who already had computer experience. Later studies such as Wilson (1990), and Summers (1988; 1990a; 1990b) aimed to study the same subject. Other studies have examined the role of computers in the school as perceived by teachers and school administrators and their attitudes toward computers (e.g. Woodrow, 1992; Byrum, 1993; Trushell et al. 1995; Yaghi, 1996; and Levin et. al., 1998). Most of these studies were addressed to respondents who mostly had knowledge and were aware of computers. Furthermore, most of the instruments used in these studies were constructed in developed countries such as the UK and USA, where computers and information technology have been the focus of much attention and education effort.

In contrast, the present study was carried out in an area where less attention has been paid to computer literacy and to information technology in general. Bukhari and Meadows (1992) found that the level of usage of computer among university scientists in SA in general was approaching that found in British universities in the mid-1980s. Al-Mohaini (1994) mentioned in his study that the adoption of computers in SA has not really been achieved in the sense that computers have not been used.

Because of the differences between the target population of the current study and those of the studies mentioned above, in terms of culture and language and the consequent differences of the study focus, studies in a similar area and with a similar population were sought. Several studies of attitude toward computers have been carried out in SA and in some other Arab countries (Fodah, 1990; Bukhari and Meadows 1992; Al-Mohaisin, 1993; Al-Mohaini, 1994; Al-Jabri, 1996; Yaghi, 1996).

Fodah's (1990) investigation sought to assess the computer training needs of educators in SA. She also measured respondents' knowledge, attitude toward computer and experience of computers. All her respondents were from King Saud University and from the Girls' Education Colleges in Riyadh with different backgrounds. Bukhari and Meadows (1992) studied the use of information technology by scientists at universities in the UK and SA. The study by Al-Mohaisin (1993) asked science teachers, their supervisors, and trainees about their attitude toward computers and investigates their computer experience, use and knowledge. Al-Mohaini (1994) sought to determine the attitude of Saudi public employees toward computers, while Al-Jabri (1996) in his study examined the gender differences in computer attitude among secondary school students in SA. Yaghi (1996) studies the role of the computer in the school as perceived by computer-using teachers and school administrators.

According to the objectives of the current study, and the similarity of the target population of this study and the previous studies in culture, language and focus of study, the researcher believed that the survey instruments used in these studies might provide a suitable starting-point for this study. Czaja and Blair (1996) declared that "Borrowing questions from other research studies is acceptable, even encouraged" (p.19). As they point out, such borrowing has the advantage that it gives the opportunity to compare the findings of the two studies with each other. Such comparison is undertaken in Chapters 6, 8 and 10, when the outcomes of this study are reported. Therefore, many items in the current survey were, accordingly, taken from Fodah's instrument. Fodah's study was conducted with a population from varied backgrounds, not only with science, and examined a range of different aspects such as computer experience, computer knowledge, attitude and training needs, which are vital concerns of this study.

For the current study two almost identical forms of instrument were formulated. One was for TC teachers and the other was for TC students. The two instruments consisted of a mixture of closed and open items. The closed items sought specific information, whereas the open items were included to give the participants an opportunity to add comments they felt necessary to elicit further information about the topic and to express their feelings about computers and their utilisation of them. These open questions were located at the end of the survey instrument.

Even though the two groups, the TC students and their teachers, were different in the level of study, there was a similarity between them. The similarity occurred since all of them had a great lack of computer knowledge and experience. This fact was elicited from studies carried out in Saudi society, where similar population samples expressed such a lack of information (Fodah, 1990; Bukhari, et. al. 1992; Al-Mohaisin, 1993; Al-Jabri, 1996).

5.4.1 Modification of the Instrument:

Before being adopted for the current study, the questionnaire items were scrutinised for their suitability in the light of the informal meeting the researcher conducted before starting the study. These had suggested that the target population lacked knowledge in the area of information technology, but had a very positive attitude toward learning about computers. Some modifications were made to the instrument to make it more suitable to the present study. Bearing in mind the fast growth of IT in recent years, some of the modifications were drawn from the nature of the present study and made from the beginning of the adaptation, while others were added in response to the suggestions of expert jurors and review of other works. The researcher sought the opinions on the changes of colleagues who were familiar with TCs in SA and experienced in research, and views of experts were sought too in this matter. Such modifications for each section of the two forms of the questionnaire, the students and the teachers' forms, are indicated below.

Section 1: Demographic Characteristics:

In this section, questions were designed to obtain general background information on respondents, namely, the college at which they work or study, department, age, qualification. Since the demographic characteristics of the two groups, the college students and the college teachers, differed, teachers were asked to express their nationality, position at work, length of experience in college and outside college, the last degree obtained, graduation year, place of study, and field of study.

Table 5.1. (A): Comparison of questionnaire items for Fodah's & the current study. Section 1(A): Teaching staff demographic characteristics

Fodah's instrument.	The current study instrument.
Use an x to describe yourself in each of the following items:	**Please write in the relevant details or, where response options are given, place an (x) by the category that best describes you:**
Nationality: ☐ Saudi ☐ Non-Saudi	**Name: (optional) ----------**
Sex: ☐ Male ☐ Female	**College: ---------- Department: ----------**
Marital status: ☐ Married ☐ Single	**Nationality: ☐ Saudi ☐ Non- Saudi (please specify) --**
Age: ☐ 20-24 ☐ 25-29 ☐ 30-34 ☐ 35-39 ☐ 40-44 ☐ 45+	**Age: ☐ 21-24 ☐ 25-28 ☐ 29-32 ☐ 33-36 ☐ 37-40 ☐ 41-44 ☐ 45+ (please specify) -----**
Position at work: ☐ Administrator ☐ Faculty ☐ Lecturer ☐ G.T.F ☐ Other, please specify: ----------	**Position at college: ☐ Professorial ☐ Lecturer ☐ Graduate assistant ☐ Administrator ☐ Other: (please specify) ----------**
Year of teaching/administrative experience: ☐ 1-3 ☐ 4-6 ☐ 7-9 ☐ 10+	**Last qualification: -------- Year option:------ Place of study: ---------- Area of study: ----**
Highest degree: ☐ High school diploma ☐ BA/BS ☐ MA/MS ☐ Ph./Ed.D	**Years of experience: In college: years Outside the college years**
Please Identify: Last major of study: ---------- Work: College: ---------- Department: ----------	

Some slight modifications were made in this part of the instrument, in the light of the researcher's experience and to match the objectives of the present study, as seen in Table 5.1, where the two questionnaire forms are presented.

As seen in the table, Fodah's instrument had no provisions for obtaining demographic information about students, since her study was addressed only to college TS. Due to the participation of students in this study, questions were devised to learn their demographic characteristics. This part was formulated according to the study's purposes. It asked about the respondent's name, which was optional, the college in which he was enrolled, department of study, age and qualification. The age grouping was also changed. Fodah's questionnaire used only six age categories, set at 5-year intervals and starting from the age of 20. Seven age groups were used in this study for the staff instrument, each spanning four years starting from 21. Those TS who were 45 years old or over were asked to state their ages. The reason for that was to see if were sufficient small to justify keeping those respondents one group; had the age range been very wide, it might have been preferred to make a separate group, as respondents who were much older would be experienced to have very different educational and computer backgrounds.

Table 5.1 (B): Comparison of questionnaire items for Fodah's & the current study. Section 1 (B): Students' demographic characteristics

Fodah instrument.	The current study instrument.
	Please write in the relevant details or, where response options are given, place an (X) by the category that best describes you:
	Name: (optional) ——————————
	College: ——————————————
	Department: ☐ Quranic study ☐ Islamic study ☐ Arabic ☐ Social study ☐ Physical Educ. ☐ Math ☐ Science ☐ Art ☐ Computer
	Age: ☐ 17-18 ☐ 21-24 ☐ +25 (please specify) ——
	Qualification: ☐ Science ☐ Art ☐ Teacher Training Inst. ☐ Others (Specify: ——

A few items were deleted from the first section of the teachers' questionnaire, the demographic characteristic section to adopt the instrument for students. Since female students in SA have separate colleges, as the whole educational system in the country is segregated, the study was addressed only to male TC teachers and students, and respondents were not asked about their gender. In the student questionnaire, respondents were not asked about their nationality, since the colleges accept only Saudi students. For the students' instrument, two ages categories were mentioned starting from 17 and students who were 25 years old or over were asked to state their ages.

Section 2: <u>Experience with computers:</u>

In this section of the questionnaire, all respondents were asked to indicate the answer(s), which reflected their experience in computers. Twelve items were listed in this part of the instrument. Teachers and students were asked to indicate their experience and familiarity with different aspects related to computers, their languages, applications, uses, length of working hours and the preferred computer course format. This section included respondents' interest in computer training, sources of learning about computers and finally, their access to computers.

For most of the twelve items, respondents were given the opportunity to indicate that they had no information, if such was the case. This option was not available in Fodah's instrument, as seen in Table 5.2. It was added to the present survey, as it was believed that most students and TS in TCs have little or no experience of computers, their applications and languages, and have had no opportunity to be trained in this field. Even though most TC students had studied computers at secondary school, they did not have the opportunity to practise what they had learned, according to information obtained in the informal meeting. One of the students mentioned that he had only been to the computer laboratory in his secondary school a few times and he had used the computer for only two or three hours in three years of study. Teachers also have no opportunity to learn in the colleges, since there is a serious shortage of computer facilities and lack of time during the teaching day.

The researcher believed that respondents should be asked where they had taken their training, in order to shed light on the main sources of respondents' experience. It was thought that this might provide some indications of the relative popularity or influence of the sources of information and training currently available. For this reason item number four in the current survey was added.

An extra item to the experience part was added, too. This item was to ask respondents what they usually use the computer for: leisure, work or for both. This question was asked so that the training programme could be tailored more accurately to the study population's needs.

Certain computer applications were added to item number 7 (number 5 in Fodah's questionnaire) in this section, such as programming, graphics, and desktop publishing. These applications were added to the instrument to reflect the applications available and to find out respondents' experience so it could be taken into account in setting up the study recommendations and conclusions. Moreover, the statement "I cannot use any of the applications above" was added to this item as another option for people who do not use computers and have no training on them.

Table 5.2: Comparison of questionnaire items of Fodah's & the current study. Section 2: (Experience with computers)

Fodah's instrument		The current study instrument	
No	**Please mark (X) the statement below that relate to your background:**	**No**	**In this section, for each question, tick all answers that apply:**
1	**I have had experience with the following computers:** □ Microcomputer □ Minicomputer □ Mainframe □ Electronic calculator □ Other, please specify ————	1	**I have had experience with the following computers:** □ Microcomputer (a complete tiny computer system) □ Minicomputer (a small digital computer) □ Mainframe □ I have no experience on computers
2	**I can use the following computer language(s):** □ BASIC □ FORTRAN □ PASCAL □ COBOL □ LOGO □ Others (please specify) ———	2	**I can use the following computer language(s):** □ BASIC □ FORTRAN □ PASCAL □ COBOL □ LOGO □ Others (please specify) ———— □ None of the above
3	**My computer training has included:** □ Workshop(s) □ Short course □ Full term course(s) □ Others (please specify) ———	3	**My computer training has included:** □ Workshop(s) □ Short course □ Full term course(s) □ Others (please specify) ———— □ I have not been computer trained
		4	**I have taken the computer training at:** □ High school □ the University □ College □ Private institution □ By practising myself □ I have no training
		5	**I usually use a computer for:** □ Work □ Leisure □ Both
4	**In an average week, I work with computers for:** □ 0 hours □ 1-3 hours □ 4-6 hours □ 6+ hours	6	**In an average week, I use a computer for:** □ 0 hours □ 1-3 hours □ 4-6 hours □ More than 6 hours (please specify) –
5	**I can use the following computer applications:** □ Word processing □ Database □ Spreadsheet □ Record-keeping □ Accounting □ Instructional program □ Other, please specify: ———	7	**I can use the following computer applications:** □ Word processing □ Database □ Record-keeping □ Spreadsheet □ Accounting □ Programming □ Graphics □ Desk-top publishing □ Instructional program □ I cannot use any application

Continued: Table 5.2: Comparison of questionnaire items of Fodah's & the current study. Section 2: (Experience with computers)

Fodah's instrument		The current study instrument	
No	**Please mark (X) the statement below that relate to your background:**	No	**In this section, for each question, tick all answers that apply:**
6	**I would attend a workshop that focused on the following three computer applications (please list in order of priority):** **1) ——————** **2) ——————** **3) ——————**	**8**	**If given a chance to attend a computer course, I would prefer a course that focused on, (please list three from the applications mentioned above in order of priority):** **1) ——————** **2) ——————** **3) ——————**
7	**I would prefer the following course format:** **☐ 1-day workshop ☐ 3-day workshop** **☐ 5-day workshop** **☐ Short course (2-3 weeks)** **☐ one term course** **☐ Other, please specify ——————**	**9**	**I would prefer the following course format:** **☐ Short course (6-10) weeks** **☐ Optional one term course** **☐ Compulsory one term course**
8	**I would describe my interest in computer training as follows:** **☐ I took computer classes and I do not need any more training** **☐ I am interested in taking a computer class (or additional computer classes)** **☐ I am not interested in taking any computer classes.**	**10**	**I would describe my interest in computer training as follows:** **☐ I have taken computer classes and I do not need any more training** **☐ I am interested in taking a computer class (or additional computer classes)** **☐ I am not interested in taking any computer classes.**
9	**I have learned the most about computers from:** **☐ Movies and television** **☐ Books, newspapers and magazines** **☐ Friends** **☐ Course work** **☐ Others, please specify ——————**	**11**	**I have learned the most about computers from:** **☐ Course work** **☐ Department colleagues** **☐ Video and television** **☐ University (college)computer center** **☐ Newspapers and computer magazines** **☐ Book ☐ Friends** **☐ Others, please specify ——————**
10	**My access to computer is:** **☐ I own one at home** **☐ I have one at work** **☐ My friend (relative) has one I use** **☐ Others, please specify ——————**	**12**	**My access to computers is:** **☐ At college or university** **☐ I own one at home** **☐ My friend (relative) has one I use** **☐ Others, please specify ——————** **☐ I have no access to computers**

In Fodah's survey, respondents had been asked to state a preference for one of five course formats (1-day workshop, 3-day workshop, 5-day workshop, short course "2-3 weeks", one term course and other). However, three of these course formats were workshops of one to five days' duration. Harper et al., (1988); Bracey, (1988) and Ryan (1991) reported that a short duration of training is ineffective and inappropriate for a population when most of them have no knowledge of computers and have not used them at all. They believed that short courses might be appropriate for educators who have some knowledge about computers and who might use them in their work. However, for students and teachers who, for the most part, lack computer knowledge, the situation is different. As a result of that, the options were changed to three longer course formats: a short course (from 6-10 weeks), a non-credit one term course or a credit one-term course. A slight change to item 11 (9 in Fodah's instrument) was made. These few options were added since the informal meeting indicated that they were other sources of learning besides those identified by Fodah.

Section 3: <u>Knowledge about Computers:</u>

In this section, respondents were requested to indicate their knowledge about computers and their elements. Seven multiple-choice items were included in this part to test the respondents' knowledge. For each item, there were five response options, one of them correct and the other four false. These items, as Fodah mentioned, were drawn from a computer literacy examination. Therefore, no change was made to them, as seen in the items listed below in Table5.3.

Table 5.3: Comparison of questionnaire items of Fodah's & the current study. Section 3: Computer knowledge

Fodah's Instrument		The current study instrument
No	For each statement below, choose the best answer by circling one of the letters:	For each statement below, choose the best answer by circling one of the letters:
1	Computers are not good for tasks that require : A) Speed B) Accuracy C) Intuition D)Something to be done over and over again E) I do not know	Computers are not good for tasks that require: A) Speed B) Accuracy C) Intuition D) Something to be done over and over again E) I do not know.
2	The main duty of a computer programmer is to: A) Operate a computer B) Prepare instructions for a computer C) Schedule jobs for a computer D) Design computers E) I do not know.	The main duty of a computer programmer is to: A) Operate a computer B) Prepare instructions for a computer C) Schedule jobs for a computer D) Design computers E) I do not know.
3	Computer software is a term that describes: A) Computer program B) Electronic components covered with soft plastic C) People who work with computers D) Mechanical and electronic parts of a computer system E) I do not know	Computer software is a term that describes: A) Computer program B) Electronic components covered with soft plastic C) People who work with computers D) Mechanical and electronic parts of a computer system E) I do not know
4	The physical parts of a computer are referred to as: A) Program B) Hardware C) Software D) Manuals E) I do not know .	The physical parts of a computer are referred to as: A) Program B) Hardware C) Software D) Manuals E) I do not know
5	A computer program is: A) A course on computers. B) A set of instructions to control the computer C) A show given by the computer D) A piece of computer hardware E) I do not know.	A computer program is: A) A course on computers. B) A set of instructions to control the computer C) A show given by the computer D) A piece of computer hardware E) I do not know.
6	An operating computer: A) Follows a set of instructions written by people B) Thinks just like a person C) Decides what to do with the data D) Translates data from digital to analogue code E) I do not know.	An operating computer: A) Follows a set of instructions written by people B) Thinks just like a person C) Decides what to do with the data D) Translates data from digital to analogue code E) I do not know.
7	A computer needs two types of information to solve a problem: A) The problem and the answer B) The name of the program and user's number C) The data and the instruction D) The name of the program and your user's name. E) I do not know.	A computer needs two types of information to solve a problem: A) The problem and the answer B) The name of the program and user's number C) The data and the instruction D) The name of the program and your user's name. E) I do not know.

Section 4: Computer Training Needs:

Computer training needs were the focus of this section of the instrument. In this part, respondents were asked to rate their need for training in sixteen areas by circling the response that most closely corresponded to their assessment for each topic. A four point-Likert scale was used, where answers were scored 4 for "Great need," 3 for "Some need," 2 for "No Need," and 1 for "Cannot Answer or No Knowledge", for people who were unfamiliar with the subject of the statement.

Six items were added to the training needs section as seen in Table 5.4. Respondents were asked about their need for training in the use of multimedia, word processing, database management, spreadsheet, using computers for presentation and knowing how to benefit from the Internet. These items were added, bearing in mind the popularity and wide use of these applications and the likelihood that their use will increase.

Table 5.4: Comparison of questionnaire item of Fodah's & the current study. Section 4: Computer training needs

Fodah's Instrument						The current study instrument
Please rate your need for training in each area by circling the response that most closely corresponds to your assessment for each topic:		**4**	**3**	**2**	**1**	**Please rate your need for computer training in each area by putting (✔) in the response that most closely corresponds to your assessment for each topic:**
1	**Be able to program in a computer language**					**Knowing how to program in a computer language**
2	**Be able to get information in and out of a computer**					**Knowing how to get information in and out of a computer**
3	**Know how to select educational computer software**					**Knowing how to select educational computer software**
4	**Learn about the history and the development of computers**					**Learning about the history and the development of computers**
5	**Learn about the role of computers in our society**					**Learning about the role of computers in our society**

4= Great need. 3= Some need. 2= No need. 1= Cannot answer- No knowledge

Continued: Table 5.4: Comparison of questionnaire item of Fodah's & the current study. Section 4: Computer training needs

Fodah's Instrument						The current study instrument
Please rate your need for training in each area by circling the response that most closely corresponds to your assessment for each topic:		4	3	2	1	**Please rate your need for computer training in each area by putting (✓) in the response that most closely corresponds to your assessment for each topic:**
6	**Know how to use a computer as a high-interest drill and practice vehicle**					**Knowing how to use a computer as a high-interest drill and practice vehicle**
7	**Know how to use a computer as a means of teaching problem solving**					**Knowing how to use a computer as a means of teaching problem solving**
8	**Know how to use computer to help with class housekeeping chores (i.e. attendance, student record)**					**Knowing how to use computer to help with class housekeeping chores (i.e. attendance, student record)**
9	**Know how to apply the computer to evaluate students**					**Knowing how to apply the computer to evaluate students abilities**
10	**Knowing how to apply the computer to diagnose students**					**Knowing how to apply the computer to diagnose students' need**
11						**Knowing how to use multimedia**
12						**Knowing how to use spreadsheet**
13						**Knowing how to use word processing**
14						**Knowing how to use database**
15						**Knowing how to use computer for presentation**
16						**Knowing how to benefit from the Internet**

4= Great need. 3= Some need. 2= No need. 1= Cannot answer- No knowledge

Section 5: <u>Attitude toward Computers:</u>

Seventeen items in this section were introduced to respondents to measure their attitude toward computers and their utilisation. Respondents were asked to express their anxiety, confidence and feelings about computers on a five-point Likert-type scale, with scores 4 for "Strongly Agree," 3 for "Agree," 2 for "Disagree," 1 for "Strongly Disagree," and 0 for "Cannot answer," due to lack of information or some other reason. Gall et al. (1996) recommended that for collecting information on attitude a "no opinion" option should be included as a possible response for respondents who lack familiarity with the topic (p 297).

A slight change was made to the attitude section. Items fifteen, sixteen and seventeen were adjusted. Since the present study was addressed to TCs' students and their teachers, items fifteen and sixteen were formulated to be in sequence: "All TC teachers should learn about computers" and "All TC students should learn about computers". Item 17 used to be "Computers can be useful in learning many subjects besides mathematics" and it was changed to "Computers should be used in learning many subjects beside science and mathematics". Only those TC students in mathematics and science divisions are required to study computers, which are considered especially applicable to these subjects.

Table 5.5: Comparison of questionnaire item of Fodah's & the current study. Section 5: Attitude toward computers

Fodah's Instrument							The Current Study Instrument
Please select your response by circling one of the numbers		5	4	3	2	1	Please select your response by putting (✔) in the response that best describes your attitude
1	I would like to learn more about computers						I would like to learn more about computers
2	I am nervous when using a microcomputer.						I feel nervous when using a microcomputer.
3	I enjoy playing computer video games						I enjoy playing computer video games
4	I feel comfortable using a computerised bank card						I feel comfortable using a computerised account card
5	I would very much like to have my own computer						I would very much like to have my own computer
6	I am looking forward to any workshop that covers the topic of microcomputer uses in school						I am looking forward to any workshop that covers the topic of microcomputer uses in school
7	I feel uneasy working with mechanical or electrical gadgets						I feel uneasy working with mechanical or electrical gadgets
8	I would like to use a computer at my school/work						I would like to use a computer at my school/work
9	I enjoy working with computers						I enjoy working with computers
10	Working through a room filled with computers would make me feel uneasy.						Working in a room filled with computers would make me feel uneasy.
11	I feel uneasy when I am with people who are talking about computers						I feel uneasy when I am with people who are talking about computers

5= Strongly agree 4 = Agree 3= Disagree 2= Strongly disagree 1= Cannot answer- No knowledge.

Continued: Table 5.5: Comparison of questionnaire item of Fodah's & the current study. Section 5: Attitude toward computers

Fodah's Instrument							The Current Study Instrument
Please select your response by circling one of the numbers		**5**	**4**	**3**	**2**	**1**	**Please select your response by putting (✔) in the response that best describes your attitude**
12	**I feel confident about my ability to use a computer**						**I feel confident about my ability to use a computer**
13	**Computers are gaining too much control over people's lives**						**Computers are gaining too much control over people's lives**
14	**Microcomputer use in school is a fad**						**Microcomputer use in school is a fad**
15	**All boys in secondary school should learn about computers**						**All teacher college teachers should learn about computers**
16	**All girls in secondary school should learn about computers**						**All teacher college students should learn about computers**
17	**Computer can be useful in learning many subjects besides mathematics**						**Computers should be used in learning many subjects besides mathematics and science**

5= Strongly agree 4 = Agree 3= Disagree 2= Strongly disagree 1= Cannot answer- No knowledge.

Section 6: <u>Comments and suggestions:</u>

Space was left at the end of the instrument for respondents to express their comments and suggestions about the whole topic. They were asked to add in this space whatever they felt could be beneficial for themselves or for the idea of introducing computers to teachers.

No such section was provided in Fodah's survey. However, the researcher thought that through this section, respondents might indicate points not covered elsewhere in the questionnaire, which could provide some important insights to the study.

Most of these modifications were drawn from the background of the researcher, from the studies that had been reviewed and according to experienced jurors' opinions.

Two versions of the instrument were offset-printed in two different colours, green for students and white for staff. This step was taken to facilitate administration and analysis by making it easy to distinguish between the two groups.

5.4.2. Validity of the instruments:

For any test, there is a great need to check the validity. Therefore, measuring the validity is very important before applying the test in practice. Hammersley (1987) reported that a great deal of research has been concerned with the concept of validity. Campbell and Fiske, (1967, cited in Gall,et al. 1996) defined validity as the agreement between two attempts to measure the same trait through maximally different methods.

There are several approaches to the measurement of validity. Gall et al, (1996) pointed out that there are four approaches to gather evidence about the validity of any test score inference as recognised by the 1985 *Standards for Educational and Psychological Testing* (referred to as *Standards*). These are called construct, content, predictive and concurrent-related evidences.

In this study, even though Fodah (1990) established the validity of the survey to check the accuracy and the clarity of each statement, the researcher checked validity for this study in various ways. After the first draft of the survey had been put together, two experts and ten colleagues of the researcher were asked to evaluate the instrument and to judge the validity of the items, the difficulty of the instrument, its length and the survey design. All colleagues were postgraduate students and undertaking some research courses. Furthermore, four of them had worked in TCs in various cities in SA and they were familiar with the environment and with the population of these colleges. The survey was distributed to them with a cover letter, and they were asked not to respond to the items, but to assess the instrument. For each item, the jurors were asked to indicate whether they considered it to be very relevant, relevant, or not relevant. Space was left for them to make suggestions. The responses were positive, and most items were assessed as very relevant or relevant. Some suggestions were presented and justified as follows:

1) One of the main recommendations of the expert jurors was to reorganise the sequence of the instrument. They suggested that the first part should remain in the beginning, the experience part be placed second, knowledge in the third section, training needs in the fourth section and attitude toward computers to be in the last part. They believed that this sequence for the questionnaire would be more logical.

2) The jurors believed that item (4) in the attitude section needed to be changed. This item was "I feel comfortable using a computerised bankcard". Since bankcards are controversial, as conventional banks deal in a manner prohibited in Islam, biased responses might be yielded. The jurors recommended that this item be changed to, "I feel comfortable using a computerised account card".

3) Choice number 4 of item number 1 in the experience section, which was about experience with calculators, was recommended to be deleted, since a calculator is not a component of the computer.

4) A new item was suggested to be added to the section on training need, about the

need to be aware of use of the Internet.

Most of the changes recommended by the expert jurors were thought to be logical. Therefore, most of them were applied to the second instrument forms.

It can be seen from the above that changes were kept to a minimum, since comparison between the findings of the two studies was one of the purposes in adopting the questionnaire.

5.4.3. Translating the questionnaire:

Since the native language of the population of the study is Arabic, the survey was translated into Arabic to ensure respondents could understand it. Copies of the Arabic version of the original survey and the translation of the new items and expressions which had been added to the questionnaire for the present study were evaluated and checked by two Ph.D. students specialising in English-Arabic translation, studying in UK Universities. This step was taken to ensure that all items retained their English meaning. The English copy and its translation into Arabic were also shown to specialists in the English Department in the Education College in Taif, a branch of Om Al-Quora University in Makka, to check the accuracy of the interpretation. The translation was approved, except that minor changes were suggested in the Arabic version to make the instrument clearer. The changes were made before further testing of the instrument and the final form of the survey was ready.

5.4.4. Timing the items:

All items were timed to detect any potential difficulty in the questions of the questionnaires. Youngman (1982) suggested that for the researcher to determine the complexity of the items of the instrument any question which takes longer than average to answer should be reworded or broken down into separate parts. Because of that, the instruments were distributed to a group of Arab graduate students studying in UK Universities, who could easily understand the language of the instruments. Some of them were familiar with computer use, while others were not. The time taken by these students to answer each item of the questionnaire was recorded in each case. From these records the mean time for each item was calculated and analysed. Any item which took more than 15 seconds was treated as a difficult and reworded in a simpler way.

5.4.5. Piloting the instrument:

To make sure that the instruments were suitable for the main study, a pilot study was carried out. The purpose behind this step was to anticipate any possible problem which might arise in the main study and find the solution for it in advance. The importance of doing so was emphasised by Youngman (1982) and Gall et al. (1996). Gall, et al. stated that a researcher should carry out thorough pre-testing of the questionnaire before applying it to the main study. Hoinville and Jowell (1978) emphasised that even if the questionnaire is borrowed from other people's work, it should be pre-tested before being applied in practice. They stated:

> "Pilot work is a relatively inexpensive way of avoiding obvious mistakes in questionnaires and improving question wording and order. There are no rigid rules for designing questionnaires: the wording and ordering of most questions are seldom obviously right or obviously wrong: more important, they can frequently be adopted and

refined. Rather than impose a precise format too early, the researcher is always well advised to base his final decisions about questionnaire construction on a series of tests. (Hoinville, et al 1978, p. 53)

They added that:

"The danger of borrowing questions, however, is that error and weakness in the questions will be repeated. The fact that a series of questions has been used before does not guarantee that they were based on extensive pre-testing or proved successful. But at least they provide a starting point and, if approached critically, can save a great deal of time and carry the benefit of comparability that would otherwise be lost" (Hoinville, et al 1978, p. 53).

The pre-testing procedure should include a sample of the study target population. It is not important how big the sample is, but the main point is that it should be similar to the study population. Moreover, respondents should be asked to make their comments and suggestions with a view to improving the instrument by leaving them a space and asking them to state in their own words what they think each question means. These procedures enable the researcher to assess the reliability of the instrument as well as to make it more understandable for the population of the main study. Since the pilot study is concerned with the instrument rather than the sample, Youngman (1982) and Gall et al. (1996) commented that the number of the sample for the pre-test need not be large; a small sample of twenty or so is common. Gall et al. indicated also that the test instrument could be piloted or pre-tested more than one time until sufficiently clear items were obtained. Consequently, the surveys in this study were piloted twice.

The First Pilot Study:

The first draft of the two questionnaires for this study was sent by mail for pre-testing to a random sample of 9 teachers and 21 students in Taif TC who were asked to express their thoughts and opinions about the clarity and comprehensiveness of the surveys. A letter to explain the purpose of the instrument accompanied each questionnaire. After completing the form, respondents were asked to evaluate and circle the difficult items and, if possible, to suggest rewording for them. This procedure was done, only in the pilot study, under the supervision of a colleague of the researcher who was asked to carry out this task.

The results indicated that there were a few items, which needed to be clarified. In the first item of the experience section, "I have had experience with the following computers: Microcomputer, Minicomputer, Mainframe computer", respondents could not distinguish the differences between the three kinds of computers. A brief explanation was added to each one to illustrate the differences between the three kinds of computers. These explanations which appeared in the instrument were taken from a bilingual computer dictionary (Al-Kilani, 1996). Several respondents indicated that they were not familiar with the computer languages, which had been listed in item (2) in the second section, the experience section. Therefore, an alternative option, "None of the above", was added for respondents who do not know about computer languages at all. In this form of the questionnaire, respondents were asked to circle the number they believed corresponded with their assessment in the training need section. Four numbers were listed in front of each statement from 1 to 4, (4) Great Need, (3) Some Need, (2) No Need and (1) Cannot answer-No Knowledge. These numbers were interpreted in the beginning of the instrument. Respondents indicated in the suggestion section that they could not go along with these options. Thus, a space under each number was left and respondents were asked to put a mark in one of these four spaces, which was labelled with the number and with an explanation of the number above the statements.

The Second Pilot Study:

The changes were applied to the instruments, and the researcher felt that the questionnaire needed to be re-piloted to ensure the clarity of all items. In the beginning of September 1997 the final drafts of the two questionnaires were distributed to samples of TC students and teachers in Taif TC in SA for the second time. The two groups were asked to express their views about the clarity and each copy of the instrument was accompanied by a cover letter to explain the purpose of the study and how to complete the questionnaire.

A sample of 25 staff and 47 students was chosen to participate in the survey. These respondents were drawn from different departments, such as Quranic Studies, Islamic Studies, Arabic Literature, Art, Mathematics, Science, Physical Education, Social Studies, Education & Psychology, Curriculum and Educational Technology. Teaching staff represented the last four departments only, since students were not available.

The results indicated that the instruments were clear and understandable. No changes were suggested.

5.4.4. Reliability of the Instruments:

Testing the instruments' reliability was one aim of the pilot study. The definition of reliability as adopted by Johnston and Packer (1980, cited in Hammersly, 1987) refers to the capacity of the instrument to yield the same measurement value when brought into repeated contact with the same state of nature. According to Gall et al. (1996), reliability varies between values of .00 and 1.00, one indicating perfect reliability of the test scores, which is never attained in practice, and .00 indicating no reliability. Gall et al. (1996) reported that Cronbach's alpha is a widely used method for computing test score reliability.

In this study, reliability was tested twice using SPSS in the first pilot study and in the second pilot study. In the first pilot study, as seen in Table 5.6, reliability varied between the three sections of the instrument, knowledge, training needs and the attitude section, and between the two groups which were tested, the TS and the students.

Table 5.6: The Reliability of the Questionnaire for the First Pilot Study

The sample	The variable	No of items	Alpha
Teachers = 9	**Knowledge**	**7**	**0.56**
	Training needs	**15**	**0.94**
	Attitude	**17**	**0.73**
Students =21	**Knowledge**	**7**	**0.44**
	Training needs	**15**	**0.90**
	Attitude	**17**	**0.75**

Alpha reliability for teachers' instrument was 0.56 for the knowledge section, 0.94 for the training needs section and 0.73 for the attitude part, while alpha reliability for students was 0.44, 0.90 and 0.75 for the same three sections. Reliability was not applicable for the experience section, since it consisted of different items and was measured by different statements.

This result gave an indication that the instruments were reasonably reliable, as the alpha for reliability was acceptable for the two instruments, except for the knowledge part of the students' questionnaire. In this part the alpha reliability was weak and recorded only about 0.44, which could be increased to 0.55 by removing item 7. However, since there are few items in this part of the instrument, it was decided not to remove this item.

The alpha reliability for the second pilot study was calculated for each part of the two questionnaires, the TS and the students' questionnaires. As presented in Table 5.7, the reliability was higher for the three parts of the two instruments, in both the teaching and the students' questionnaires, than in the first pilot study.

Table 5.7: The Alpha Reliability for the Second Pilot Study

The sample	Variables	No of Items	Alpha
Teachers =25	**Knowledge**	**7**	**0.80**
	Training Needs	**16**	**0.95**
	Attitude	**17**	**0.91**
Students = 47	**Knowledge**	**7**	**0.73**
	Training needs	**16**	**0.83**
	Attitude	**17**	**0.67**

The results, as seen in Table 5.7, indicated that the instruments had been made more reliable, since the alpha reliability was improved from the first study. This improvement might be due to two reasons. First of all, the researcher himself administered the surveys. Secondly, increased reliability might be attributable to the alterations made to the instruments.

5.4.7. The Sample of the Study:

In accordance with the purpose and the nature of this study, the survey was based on TCs' students and teaching staff in SA. Yaremko et al. (1982) defined the population of a research study as the entire collection or set of objects, people or events, of interest in a particular context, or the set of the measurement on the members of the population (p177).

Even though it was recognised that the study should ideally be oriented to male and female respondents, the target population of this study were male only. The reason behind that, as mentioned in the second chapter, was that education in SA is segregated. Thus, it is strongly recommended that a similar study should be carried out for female colleges.

5.4.7.1. Determination of sample size:

The sampling literature does not fully address the question of how big a sample should be (Oppenheim 1992). However, there are some determinants of sample sizes. One of these determinants is the homogeneity or heterogeneity of the population. So, if the population were homogeneous, a small sample would suffice, whereas a small sample might not be satisfactory for a heterogeneous population. The other important determinant is the accuracy of the sample representations. A properly drawn sample of a small number of cases can give more reliable estimates on a population of many millions than a poorly drawn huge sample of hundreds of thousands (Oppenheim 1992). Other factors determining sampling size selection are the precision of the sampling operation, the required accuracy of the population estimate and the costs and personal availability for the study (Churchill, 1979; and Oppenheim, 1992).

In regard to all these factors, a rule of thumb in sampling is to draw as large a sample as time and cost allow, since the reliability or precision of the sample statistics increases in proportion to the sample size. Kerlinger (1986) indicated that students of research should use as large a sample as possible.

5.4.7.2. The sample size of the study:

Since the researcher intended to generalise the results to all TCs in SA, the sample is scattered over the country and because it is hard to deal with the whole population of these colleges, a random cluster sample of five TCs was selected to represent all TCs in the country. As Hoinville and Jowell (1978) mentioned, clustering has the advantage of allowing a larger sample to be manipulated with less cost and reduced sample error. However, they stated also that one of the disadvantages of clustering is that it reduces the precision of the sample. That can occur when people in the same area tend to be similar in respect of the survey variables. One of the most common forms of clustering, according to Hoinville and Jowell (1978), is clustering by area. This was the approach followed in this study.

The 1997 yearly report of the "Deputy of the Teacher Colleges in the Ministry of Education in SA" (Ministry of Education 1998) revealed that there are seventeen TCs distributed around the country in seventeen cities, plus one college for preparing Physical Education teachers in Riyadh. Four of these colleges were located on the north side of the country in the cities of Tabouk, Skaka, Arar, and Hail. Two colleges were located in the central region of the country, one in the capital city, Riyadh, and the other in the city of Al-Rass. In the south region, there are four colleges, one in Abha, the other in Jazan, the third in Bisha, and the fourth one in Al-Baha. Five colleges are in the west part of the country, one each in the Holy City of Makkah, in Al-Madinah, in Taif, in Jeddah and in Al-Konfodah. The last two colleges are in the east part of the country, in Al-Dammam City and in Al-Ahsa.

It is worth noting that all the seventeen TCs are under the supervision of the same administration, which is the Department of the Deputy of the Ministry of Education for Teacher Colleges, otherwise known as "The Teacher Colleges Administration" (TCA). They are similar, if not identical, in purposes, in curriculum, in requirements and in the areas of study. Moreover, these TCs accept similar students, and follow the same rules for treating students and their teachers. Therefore, a cluster of five colleges was chosen as samples to represent the different geographical regions. Riyadh TC from the central part of the country was intentionally chosen for several reasons. It is the oldest and the biggest TC in the country. This TC also is one of the three TCs in the country where a department of computers has been added as a new area of study. Furthermore, Riyadh TC was chosen since it is close to the place of making the decisions for the other TCs, the Department of Deputy of Ministry of Education for Teacher Colleges in Riyadh. The other TCs were randomly selected: Dammam TC from the east part, Taif TC from the west part, Jazan TC from the south part of the country and Tabouk TC to represent the north part of the country.

Table 5.8: The students' distribution in Teacher Colleges of Riyadh, Dammam, Taif, Tabouk and Jazan in the first semester of 1997-1998

The College	Freshmen	Sophomore	Junior	Senior	Total
Riyadh TC	703	556	367	259	1885
Dammam TC	329	248	195	114	886
Taif TC	310	299	310	354	1273
Tabouk TC	383	316	274	228	1201
Jazan TC	379	411	309	251	1350
Total	2104	1830	1455	1206	6595

As regards the students in these five TCs, as seen in Table 5.8, there were about 6595 students enrolled in the first term of the year of 1997-98, in all divisions. In Riyadh TC there were about 1885 students, 886 students were in Dammam TC, 1273 students enrolled in Taif

TC, 1201 students were in Tabouk TC and 1350 students were in Jazan TC.

Table 5.9: The teaching staff distribution by qualifications

The College	PhD	MA. MS.	BA.BS	Others	Total
Riyadh	80	56	45	4	185
Dammam	46	16	20	1	83
Taif	43	36	21	5	105
Tabouk	42	23	20	4	89
Jazan	45	18	17	9	89
Total	256	149	123	23	551

The Teaching staff population in these five TCs, as seen in Table 5.9, was 551 in different fields of study and with different qualifications.

In the present study, cost and time were major determining factors for the sample size. The sample size targeted for this study was a maximum of 710 students from different levels of study and about 220 TS from all the departments in these five TCs. A group of 140 students and 44 TS from each TCs were selected randomly. Students were distributed among seven divisions of study, and TS scattered among eleven divisions. These departments were Quranic Study, Islamic Study, Arabic Language & Literature, Physical Education, Mathematics, Science and Art, plus a Computer Studies department in Riyadh and Dammam TCs only. Five questionnaire formats were added to each of Riyadh and Dammam TCs to represent those students in the first level of the Computer Studies. The other departments, which are called support departments and in which no students are enrolled, are Social Studies, Education and Psychology, Curriculum, Educational Technology. No TS represented the Computer Studies departments in Riyadh and Dammam TCs, since no TS had been appointed to these departments when the study was carried out.

A number of 20 students and 4 TS from each department of studies available in each college were selected randomly. For the students sampling the investigator's assistant was asked to draw out randomly five students from each level in each department of study from the students' list, which is available in each department for each level of study.

5.4.8. The administration of the questionnaires:

In arranging research access, a number of steps had to be taken. As an initial approach, in accordance with the regulations of the education authorities in SA, a letter from the investigator's supervisor was prepared to obtain permission for the study to be conducted in TCs in SA. The Saudian Cultural Bureau in the UK also wrote a letter to explain the researcher's need to carry out the fieldwork in SA. As a result of these two letters, great support was obtained. Letters to the deans of the TCs where the study would be carried out were written by the Dean of the Research and Study Centre in the TCA making a request to facilitate the procedures of the study. The researcher went to SA for a period of approximately six months to conduct the field study, starting at the beginning of September 1997 and then returned to the University of Hull by the end of February of 1998.

A great deal of effort was put into acquiring a high percentage return of the questionnaires. All the questionnaire parts were put together on one sheet of thick paper, A4 size, using both faces, and with each page divided into three parts, so the form could be folded into three sections.

The title of the instrument was printed on the face of the form. An introductory letter was written on the first part of the sheet, explaining the reason for the survey, to ensure that each respondent knew what he was committing himself to, and also so that the respondents understood the nature of the responses required (Appendix A). Students and their teachers were asked to respond to all items on the questionnaire, and it was emphasised that their opinions and views were very valuable for the study. Respondents were assured that all information obtained would be held in confidence and used only for the purpose of the study only. As Gall et al. (1996) stated, "As the cover letter accompanying the questionnaire strongly influences the return rate, it should be designed carefully" (p.299). They also emphasised that a brief assurance of confidentially should be included in the introductory letter.

As the main study was mainly concerned about the TCs students' and TS experiences on computers, knowledge and skills in the use of computers, their training needs and attitude toward computers, it was decided to administer the questionnaires in the period between the beginning of November 1997 and the middle of December 1997. The middle of the first term was thought to be the most suitable time for distributing the surveys in SA, since students and their teachers at this time of the year would be more available and free from examinations.

5.4.9. Distribution of the questionnaires:

The distribution of the questionnaire by the researcher himself was considered since most experts warn of low responses from postal distribution (Oppenheim, 1992). However, since colleges were widely scattered, personal distribution would have been excessively consuming of time and resources; special arrangements were, therefore, made with one of the staff in each TC to give assistance to the investigator. The investigator phoned the deputy Dean of each college, who was the investigator's assistant in each college and explained to him in detail, how the surveys should be administered and completed. The instructions for completing the survey were written and posted with the surveys to the investigator's assistant in each TC. Respondents were asked to hand back the completed questionnaire forms to the investigator's assistant. Assistants were asked to note any questions raised by respondents and report them directly to the researcher, to be clarified. They were also requested to hand back all completed questionnaires to the researcher. Direct telephone connections were opened between the researcher and the assistants during the time of completing the questionnaires. A short visit was made to Riyadh to make the arrangements for the interview with the officials in the Ministry of Education. The researcher also visited Riyadh TC and during the visit, the questionnaires were distributed. An arrangement was made with one of the staff in this college to report back any problem encountered when filling the questionnaires and to collect them.

During the survey period, the investigator travelled between the different colleges, co-ordinating the process, and doing a follow up whenever it seemed necessary. The whole process, generally, operated without any serious problems reported.

The number of distributed questionnaires, the returned forms and the valid forms are as shown in Table 5.10.

Table 5.10: The number of questionnaires distributed, returned and valid forms for the teaching staff and the students

Teacher Colleges	Respondents	Distributed form	Return form		Valid form	
		Freq.	Freq.	%	Freq.	%
Riyadh TCs	Staff	44	42	95.4	40	90.9
	Student	145	121	83.4	116	80.0
Dammam TC	Staff	44	20	45.4	15	34.0
	Student	145	114	78.6	97	66.8
Taif TC	Staff	44	40	90.9	37	84.0
	Student	140	102	72.8	91	65.0
Tabouk TC	Staff	44	32	72.7	20	45.4
	Student	140	92	65.7	54	38.5
Jazan TC	Staff	44	38	86.3	35	79.5
	Student	140	115	82.1	114	81.4
Total	Staff	220	172	78.2	147	66.8
	Student	710	544	76.6	472	66.4

5.4.10. Data analysis:

The data from the valid forms were entered onto computer by the researcher for analysis. The Statistical Package for Social Science (SPSS) was used for analysing data in this study since it was recommended by Youngman (1979) as "the most popular choice where it is available" (p. 41). Data were coded and entered into personal computer. To reduce the entry-error a printout was checked. A descriptive analysis was conducted of all part of the questionnaire by running a frequency distribution procedure to find out about the respondents' computer experience, computer use, familiarity with computer languages and applications, purpose of computer use, source of learning about computers, computer knowledge and computer training needs. The chi-square test was applied using a cross-tabs procedure when inferential information was required and to investigate the relationship between the demographic characteristics of respondents and their responses to the questionnaires. The Independent- Sample *t test* was used to test the null hypotheses related to the attitude scales means in relationship to respondents' characteristics, such as computer experience, computer use, availability of access to computers for all respondents and for nationality for TS. The statistical technique of One- Way Analysis of Variance (ANOVA) was used with variables, such as college location, work department/study, age, and level of study for students only, to investigate the relationship between these variables and the respondents' mean scores in the attitude scales: WANT, ENJOYMENT, ANXIETY and NEED. Scheffe's tests were applied to clarify the differences between the mean scores, whenever significant differences existed between and within groups in any of the four attitude scales.

5.5. Setting up the interviews:

As described in Chapter Two, TCs in SA are supervised and directed by three authorities. The top authority is the Committee of Teacher College Deans, which consists of the deans of the seventeen TCs and the College of Physical Education, plus the Minister of Education as the president and the Deputy of the Ministry of Education for Teacher Colleges as the vice president. The TCA is the other authority, which is responsible for putting the decisions taken by the Committee into practice. The third authority is the Teacher College Board, which consists of the head of each academic department and is directed by the College Dean. Even though the educational system in SA is controlled centrally by the Ministry of Education and all the important decisions come from the Ministry, the TCA has the authority to supervise and direct most of the rules in these seventeen TCs, plus the Physical Education College, with the assistance of each TC's Dean and Committee (Ministry of Education, 1996).

The interview method was considered the best way to explore officials' views and opinions about computer literacy for TC students and staff and their attitudes toward computers and their usefulness. The interviews aimed to examine the TCs' official policy for teaching and training staff and students in the use of computers. The computer experience that TC staff and students have, their computer training needs and the attitudes that they have toward computers, in the perception of the officials, were researched in depth as other aims in the interviews. Themes that could not be covered through the questionnaire survey, such as the availability of the hardware, software, human resources and the plan for the new computer literacy courses were included in the interview.

To achieve these aims, only a very small number of people were required, capable of supplying this information in depth. Gall et al. (1996) outlined three major types of interviews: key informant interviews, survey interviews and group interviews. They defined key informant interviews as "collecting data from individuals who have special knowledge or perceptions that would not otherwise be available to the researcher" (p. 306). Because these individuals, as claimed by Gall et al. (1996) are usually small in number, the interview is a popular way to assess their views and opinions.

For this study, the interview method was used to add another dimension to the gathering of survey data, which was not provided by the other method. The interviews also ensured face-to-face dialogue with the decision-makers in these colleges and related authorities, to explore their opinions and views about the problem being investigated.

During the visit to Saudi Arabia between September 1997 and February 1998, the researcher interviewed several people who are in charge of taking the important decisions in the department of the Deputy of the Ministry of Education for Teacher Colleges and other official people in the Ministry of Education in Riyadh, in Riyadh and Taif Teacher Colleges and in the Educational District at Taif City. The computer teachers in the five teacher colleges, which represented the seventeen Teacher colleges in Saudi Arabia, were interviewed too. These people play a big role in the planning for adding computer literacy courses to the teacher college curriculum. Therefore, it was felt to be of great importance that their attitudes, disposition, and suggestions be considered as part of the study inquiry. More data related to this instrument are presented and discussed in Chapter 9.

5.6. Summary:

This chapter has briefly re-stated the objectives of the present study and explained the methods adopted to achieve them. A combination of quantitative research, using a questionnaire survey, and qualitative research by means of interview, was adopted.

No existing questionnaire could be found, which was completely suitable for adoption in the present study, due to the relative lack of computer experience among the target population, compared to those in previous studies, and due to differences in research objectives. The instrument used by Fodah (1990) provided a useful starting point, but was modified by the researcher in the light of his personal experience and informal meeting held with similar population. Piloting of the instrument yielded moderate reliability scores, measured by Cronbach's alpha. Further modification was made to increase the clarity of the instrument, resulting in high reliability scores in the second pilot study.

The target populations for this study were students and TS in TCs in SA. Because of the strictly segregated education system in the country, only men's colleges were surveyed.

Of seventeen TCs distributed around the country, five were chosen to participate in the study, one from each geographical region.

Questionnaires were distributed to random samples stratified by department and level of study: 145 students from each of Riyadh and Dammam TCs, 140 students from each of Taif, Tabouk and Jazan TCs and 44 TS from each of these TCs. The researcher distributed the questionnaires in person, in the case of Riyadh and Taif TCs. In the other colleges the questionnaires were sent by post and were distributed and collected by a designated member of staff. A good overall response rate (78% and 74%) was achieved from both staff and students respectively. The Statistical Package for Social Science (SPSS) programme was used for analysing data.

To complement the information obtained through the questionnaires, three sets of interviews were also carried out. Semi-structured interviews with open questions were constructed for use with officials with decision-making and supervisory authority in relation to the TCs and to the educational district. The aim of these interviews was to learn about the official objectives of the computer courses, facilities available, related policy matters, and the official perceptions of college staff and students' computer training needs and attitudes.

The second set of interviews were similar in format, and were carried out with teachers of existing computer courses attended by mathematics and science students, to find out what they thought of the courses, the available facilities, and staff and student needs and attitudes.

The third group interviewed was the Taif Educational District officials, to investigate their views and opinions about the real practical use of computers in primary and secondary schools, and their perceptions of the need for future teachers to be trained in the computer technology. Thus, the researcher was able to explore in depth the issues of concern, both quantitatively and qualitatively. The information obtained is presented in the following chapters.

CHAPTER SIX

TEACHER COLLEGE STAFF QUESTIONNAIRE ANALYSIS

CHAPTER 6

Teacher College Staff Questionnaire Analysis

6.1. Introduction:

This chapter presents the responses of teaching staff (TS) from the five Teacher Colleges (TC) to the questionnaire concerning aspects of computer experience, computer knowledge, and computer training needs. Data from the attitude scales are presented, together with corresponding data for students, in Chapter 8, while data obtained through interviews are presented in Chapter 9. Background details of TS such as college location, work department, age, nationality, year of last qualification obtained and place of study are discussed in this chapter under the heading of demographic characteristics; questions on these matters made up the first section of the questionnaire.

For ease of interpretation, the findings are grouped in sections, corresponding with the sections of the questionnaire. First, however, the TS sample will be described.

6.2. Description of the teaching staff sample:

As mentioned in the methodology section, Chapter 5, the target sample of the study was identified as all teaching staff (TS) and students in the seventeen TCs, which are distributed all over the country of Saudi Arabia. Since it is difficult to deal with this large sample and because of the similarity among all this population (see Chapter 5), five TCs were chosen as a sample to represent the five regions of the country. Riyadh

TC was chosen to represent TCs in the Central region, Dammam TC was chosen to represent TCs in the Eastern region, Taif TC was chosen to represent TCs in the West, Tabouk TC was chosen to represent TCs in the North and Jazan TC was chosen to represent TCs in the South region of the country. In each of these five TCs, eleven academic departments were available, namely, Quranic Studies, Islamic Studies, Arabic Literature, Social Studies, Physical Education, Mathematics, Science, Art, Curriculum, Education and Psychology in one department, and Educational Technology. In each of Riyadh and Dammam TCs, a new department, the Computer Studies department, was established in 1997 and some students were enrolled. However, this department was not included in the study sample, since TS have not been appointed yet. From each of these five TCs a sample of 44 TS was randomly selected, four from each academic department.

Table 6.1: The total teaching staff in the five teacher colleges

College	Qur	Islam	Arab	Soc.	Phy edu.	Math	Scie.	Art	Curr	Edu	Tech	Total
Riyadh	20	15	19	7	10	14	48	9	16	20	7	185
Dammam	5	9	7	4	7	8	20	5	9	5	4	83
Taif	13	8	13	5	6	10	18	4	4	20	4	105
Tabouk	8	10	11	4	6	11	15	5	6	8	5	89
Jazan	5	11	12	5	9	7	25	5	2	7	4	92
Total	51	53	62	25	38	50	126	28	37	60	24	554

Qur= Quranic studies; Islam= Islamic studies; Arab= Arabic Literature; Soci= Social Studies; Phy edu+ Physical Education; Scic= Sciencc; Curr= Curriculum; Educ= Education & Psychology; Tech= Educational Technology

A total of 220 questionnaires were distributed to these five TCs starting from the beginning of November 1997; responses were collected and received by the middle of December 1997, with the great cooperation of the coordinator's administrator in each of these five TCs.

Table 6.2: Teaching staff questionnaire response rate by college

Teacher College location	Staff sample		Questionnaires returned		Valid forms	
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**
Riyadh TC	**44**	**100.0**	**42**	**95.4**	**40**	**90.9**
Dammam TC	**44**	**100.0**	**20**	**45.4**	**15**	**34.0**
Taif TC	**44**	**100.0**	**40**	**90.9**	**37**	**84.0**
Tabouk TC	**44**	**100.0**	**32**	**72.7**	**20**	**45.4**
Jazan TC	**44**	**100.0**	**38**	**86.3**	**35**	**79.5**
Total	**220**	**100.0**	**172**	**78.2**	**147**	**66.8**

Response rates ranged from about 45% from Dammam TC to 95% from Riyadh TC (Table 6.2). However, not all questionnaires received were valid to be analysed. Some forms were discarded because they were incomplete, or improperly completed or had been completed by inappropriate groups such as administrators.

The valid questionnaire responses are shown in the table. The lowest valid response rate was 34% from Dammam TC, while the highest was 91% from Riyadh TC. The overall percentage of valid questionnaires returned for all five TCs was about 67% (147 responses).

6.3. The respondents' demographic characteristics

In the first section of the instrument, respondents were asked to give certain demographic information in order to obtain an overview of the factors that might have a bearing on their views or opinions about their computer experience, knowledge, training needs and attitudes.

TS were not evenly distributed among subject areas. As seen in Table 6.3, while about 13% Physical Education staff and 12% from Mathematics TS completed the questionnaire, only 5% from each of Quranic Studies and Social Studies did so. The percentages of respondents completing the questionnaires in the other departments ranged from 7% in the Arabic department to less than 12% in Education and Psychology. Eight respondents did not indicate their work departments.

Table 6.3: Distribution of teacher colleges regarding their department of work

Work departments	Freq.	%
Quranic Studies	7	5.1
Islamic Studies	11	7.9
Arabic literature	10	7.2
Social Studies	7	5.0
Physical Education	18	12.9
Mathematics	17	12.2
Science	13	9.4
Art	12	8.6
Curriculum	14	10.1
Education & Psychology	16	11.5
Educational Technology	14	10.1

Since there were small numbers of respondents in some departments and for statistical purposes, similar departments were combined to create four department groups. Quranic Studies, Islamic Studies and Arabic Literature were combined in one group called theoretical departments (TD); Physical Education and Art departments in the second group, called practical departments (PD); Science and Mathematics departments in the third group, called Scientific departments (SD), and Social Studies, Education and Psychology, Educational Technology and curriculum departments were brought together under the heading of educational departments (ED) in the fourth group. Respondents' distribution by these department groups, as well as their qualification, year of graduation, nationality, place of study, age group and teaching experience can be seen in Table 6.4.

Table 6.4: The teaching staff demographic characteristics

Personal characteristics		Freq.	%
College location	**Riyadh TC**	40	27.2
	Dammam TC	15	10.2
	Taif TC	37	25.2
	Tabouk TC	20	13.6
	Jazan TC	35	23.8
Work departments	**Theoretical departments**	28	20.1
	Practical departments	30	21.6
	Scientific departments	30	21.6
	Educational departments	51	36.7
Qualification	**Ph.D.**	90	61.2
	MA, MS	27	18.4
	Special diploma	6	4.1
	BA, BSc	24	16.3
Year of graduation	**1968-87**	47	32.4
	1988-1992	58	40.0
	1993+	40	27.6
Nationality	**Saudi**	61	41.5
	Non-Saudi	86	58.5
Place of study	**Saudi Arabia**	42	28.6
	Other Arab countries	71	48.3
	USA	9	6.1
	Europe	23	15.6
	India	2	1.4
Grouping age	**21-36**	39	26.5
	37-40	26	17.7
	41-44	27	18.4
	45-48	36	24.5
	49+	19	12.9
Teaching experience	**1-5**	23	15.7
	6-10	21	14.4
	11+	102	69.9

In regard to the distribution of respondents' ages, as seen in the table, about three quarters of the TS sample (108) were 37 years and over, while only about a quarter (39 staff) were between the ages of 21 and 36.

Since it was thought that the TS's qualifications and the year they were obtained might have some influence on their computer experience, knowledge and their attitude toward computers, respondents were asked to indicate their qualification and the year it was obtained.

Table 4 shows that about two-thirds of the TS population in the study sample had a PhD; the other third had MA or MSc qualifications, a higher special diploma or a bachelor degree.

TS were asked about the year of their graduation, because teachers who were trained in the late eighties and subsequently might be more likely to have used computer facilities than educators who were prepared before that.

Table 4 shows that about a third of the TS graduated before 1987, while more than two thirds graduated in or after 1988. Furthermore, about 28% of TS respondents obtained their qualifications in or after 1993.

As mentioned in Chapter Two, TS in TCs came from different educational backgrounds, since a large number of them came from outside the country and some of the Saudi TS had been educated abroad. The educational background of respondents might influence their computer experience, computer knowledge, assessment of computer training needs and their attitudes toward computers. In that respondents who completed their studies in developed countries where educators were familiar with computers and their utilisation might have more computer experience and knowledge than those who were educated in developing countries. For these reasons, the place of study was considered as an important factor for TS.

As seen in Table 6.4, 28% of the study population (42) completed their last studies in SA, about half in other Arab countries, and the remainder completed their studies in the USA, Europe, and in the case of two respondents, in India. Thus, it is evident that TS in TCs were educated in different educational systems.

Related to the educational background of respondents, the nationality of TS was investigated too. Table 6.4 shows that about 59% of the TS respondents were non-Saudi and the remaining 42% were Saudi staff.

Experience in the TCs and outside the college was also investigated in relation to the personal characteristics of TS, because a member of staff who is familiar with the TC educational curriculum would be expected to be aware of the strengths and weaknesses of current computer provision for college students. Therefore, TS were asked to indicate their length of experience in the TC and elsewhere.

Table 6.4 shows that, while about 70% of the TS had 11 years or more of experience inside and outside college, only 16% had 5 years or less and about 14% had from 6-10 years of working experience.

6.4. Reliability of the questionnaire for the main study:

The Knowledge of Computers, and Computer Training Needs sections of the instrument used in this study had been tested for reliability value by their developer (Fodah, 1990). Alpha coefficient of internal consistency was used for that purpose and the results were, for Knowledge of Computers 0.83 and for Computer Training Need

0.90. It was not appropriate to calculate reliability for the Experience with Computers section, as the developer reported, because it is not applicable.

It can be seen that both sections of the instrument had high reliability for the previous study. The same was true for the two pilot studies carried out by the researcher himself, before using the instrument for the main study (Chapter 5).

The data supplied by 147 TS in the main study were used to estimate the sensitivity and the internal consistency reliability of the same sections, Knowledge of Computers and Computer Training Needs. The same tool, Cronbach's Alpha, was used for the two sections.

6.4.1. Reliability for Computer Knowledge section:

The Cronbach's Alpha reliability of the Computer Knowledge section was 0.85 and the inter-item correlation ranged between 0.44 for the first item and 0.70 for item 4, as seen in Table 6.5. These results indicated that this part of the instrument appeared to be homogenous and adequately reliable to measure respondents' computer knowledge for the TS in TCs in SA.

Table 6.5: Reliability analysis of Computer Knowledge section

Knowledge statements	Item total correlation	Alpha if item deleted
Computers are not good for tasks that require intuition	.44	.85
The main duty of a computer programmer is to prepare instructions for a computer	.62	.83
Computer software is a term that describes a computer program	.68	.82

Continued: Table 6.5: Reliability analysis of Computer Knowledge section

Knowledge statements	Item total correlation	Alpha if item deleted
The physical parts of computer are referred to as hardware	.70	.82
A computer program is a set of instructions to control the computer	.64	.83
An operating computer follows a set of instruction written by people	.56	.84
A computer needs, to solve a problem, the name of the program and user number	.64	.83
N of Cases = 146	N of Items =7	Alpha = .85

6.4.2. Reliability for Computer Training Needs section:

The Cronbach's Alpha procedure was also applied to test the reliability of the Computer Training Needs scale to investigate the inter-correlation between the instrument items.

Table 6.6: Reliability analysis of Computer Training Needs section

Computer Training need items	Item total correlation	Alpha if item deleted
1) Knowing about programming	.54	.90
2) Knowing how to get Information in and out of a computer	.55	.90
3) Knowing how to select educational software	.60	.90
4) Learning about the history & the development of computer	.41	.91
5) Learning about the role of computer in society	.48	.91
6) Knowing how to use a computer as a high interest drill and practice vehicle	.66	.90
7) Knowing how to use computer as a means of teaching problem solving	.65	.90
8) Knowing how to use computer to help with class housekeeping	.59	.90
9) Knowing how to use computer to evaluate students	.54	.90
10) Knowing how to apply the computer to diagnose students' abilities	.53	.90
11) Knowing how to use Multimedia	.58	.90
12) Knowing how to use spreadsheet	.69	.90
13) Knowing how to use Word Processing	.74	.89
14) Knowing how to use Database management	.58	.90
15) Knowing how to use computer for presentation	.67	.90
16) Knowing how to benefit from Internet	.57	.90
N of Cases =141	N of Items = 16	Alpha = 0.91

Cronbach's Alpha reliability was 0.91, with the range of inter-item correlation between 0.41 for item 4 to 0.74 for item 13 (Table 6.6). Since the lowest inter-item correlation was above the range of 0.35-0.65, which is suggested by Gall et al. (1996) as "useful and statistically significant beyond the 1 percent level", no item was omitted from the instrument. The scale was sufficiently reliable and homogenous to test the computer training needs of TS.

6.5. Testing the hypotheses:

In this section the TS's computer experience, computer knowledge and computer training need were presented. The relationships between these variables and the respondents' personal characteristics were investigated, as well relationship among these variables themselves.

6.5.1. Experience and computer use:

The respondents' computer experience and use in regard to their familiarity with computer, awareness of computer languages, place of computer training, purpose of using computers, availability of access to computers, average hours respondents usually work in computers, interest in computer classes and sources of learning about computers were studied. Several hypotheses related to these variables and the respondents' personal characteristics and between these variables themselves were tested.

6.5.1.1. Familiarity with types of computer:

The first question of the Experience section was related to the familiarity of TS with the different types of computers: Were participants familiar with any of the three types of computers mentioned, microcomputers, minicomputers and mainframe computers, or not?

Table 6.7(A): Type of computers and teaching staff distribution

Computer types	Yes		No	
	Freq.	**%**	**Freq.**	**%**
Experience with micro-computer	**74**	**50.3**	**73**	**49.7**
Experience with mini-computer	**36**	**24.5**	**111**	**75.5**
Experience with mainframe computer	**25**	**17.0**	**122**	**83.0**
No experience with any type	**35**	**23.8**	**112**	**76.2**

The results as seen in Table 6.7(A), revealed that a quarter of respondents had no experience with any of the three types of computers mentioned. However, 50% of all respondents indicated that they had some experience with microcomputers, while about 25% had some experience with minicomputers and only 17% had some experience with mainframe computers. Mainframe computers are not available in all TCs; therefore, TCs used minicomputers instead, where there is a server, which supplies data to several stations. These are mostly used in the Administration offices. The total number of responses to this item was 170, which is more than the actual population of the study (147), since several respondents had experience of more than one type of computer.

More investigations were carried out to explore these results further. Chi square tests were applied to test the null hypothesis that:

There is no significant association between respondents' having no experience with computers and their personal characteristics, e.g. college location, work department,age, nationality, qualifications, and place of study.

Table 6.7(B): The association between respondents' lack of experience with any type of computers and work departments

Work departments	No experience with any types of computer				Chi square value
	Yes		No		P=0.005
	Freq.	%	Freq.	%	
Theoretical departments	13	46.4	15	53.6	
Practical departments	6	20.0	24	80.0	
Scientific departments	2	6.7	28	93.3	
Educational departments	13	25.5	38	74.5	

The null hypothesis was accepted for college location, age, nationality, qualifications, and place of study, since no association was found between respondents' indicating lack of experience with these three type of computers and their personal characteristics. However, a significant association was found between work departments and respondents' indicating lack of experience with computers (see Table 6.7B). The implications of this and other significant results will be considered in a later chapter.

Chi square tests revealed no significant association between respondents' having experience with microcomputers, minicomputers and mainframe computers and their personal characteristics, except, again, in relation to their work departments. They were significantly associated with respondents' having experience with microcomputers (P=0.024); and having experience with mainframe computers (P=0.015).

6.5.1.2 Familiarity with computer languages:

The following question was, were respondents familiar with computer languages? Most of the known computer languages were listed, such as BASIC, LOGO, PASCAL, COBOL, FORTRAN and the option of others was given for languages not mentioned.

Table 6.8(A): Computer languages and teaching staff distribution

Computer languages	Can use		Can not use	
	Freq.	**%**	**Freq.**	**%**
BASIC	**75**	**51.0**	**72**	**49.0**
LOGO	**4**	**2.7**	**143**	**97.3**
PASCAL	**11**	**7.5**	**136**	**92.5**
COBOL	**7**	**4.8**	**140**	**95.2**
FORTRAN	**18**	**12.2**	**129**	**87.8**
Can not use any	**63**	**42.9%**	**84**	**57.1%**

The results, as seen in Table 6.8 (A), indicated that respondents had no experience or very little experience with any of these languages, except for BASIC, with which about half the TS claimed to be familiar. LOGO, PASCAL, COBOL and FORTRAN were little known, with only small proportions of TS able to use any of these four computer languages. For the "other" option, no respondent mentioned any other language. Since about half the respondents knew only BASIC, no further investigation was carried out on the distribution of respondents in the other computer languages.

A chi square test was carried out to test the null hypothesis that:

There is no significant association between respondents' lack of familiarity with any of these computer languages and their personal characteristics.

Table 6.8(B): The association between respondents not familiar with computer languages and their work departments

Work departments	Not familiar with any of these languages				Chi square value
	Yes		No		
	Freq.	%	Freq.	%	P=0.000
Theoretical departments	23	82.1	5	17.9	
Practical departments	12	40.0	18	60.0	
Scientific departments	6	20.0	24	80.0	
Educational departments	20	39.2	31	60.8	

The hypothesis was accepted and no associations were found between respondents' non-familiarity with all computer languages listed and their personal characteristics except work departments, where a significant association was found, as seen in Table 6.8(B). Therefore, the null hypothesis was rejected only in relation to work departments and accepted for the other factors: college location, work department, age, nationality, qualifications, and place of study.

The association between respondents' familiarity with BASIC and their personal characteristics was also tested by the use of chi- square. A significant association was found only with work departments, with a probability of <0.05.

6.5.1.3 Type of computer training respondents received:

The third question was about the type of computer training respondents had received.

Table 6.9 (A): Type of training and the distribution of teaching staff

Type of computer training	Yes		No	
	Freq.	%	Freq.	%
Workshop	26	17.7	82	82.3
Short training	43	29.3	104	70.7
Full Course(s)	37	25.2	110	74.8
I had not trained on computer	53	36.1	94	63.9

The results are shown in Table 6.9 (A) from which it can be seen that more than a third of all TS respondents had not had any computer training. In this table the total numbers of responses was greater than the number of respondents, since some respondents indicated more than one type of computer training.

Table 6.9 (B): The association between non- computer trained respondents and their work departments

Work department	Not attended any computer training				Chi square
	Yes		No		
	Freq.	%	Freq.	%	P=0.000
Theoretical departments	20	71.4	8	28.6	
Practical departments	8	26.7	22	73.3	
Scientific departments	5	16.7	25	83.3	
Educational departments	19	37.3	32	62.7	

For the non-computer trained option, a chi square test was carried out of the null hypothesis that:

There is no significant association between respondents did attend any computer training among their demographic characteristics.

The null hypothesis was accepted for all characteristics except respondents' work departments, where a significant association was found, as seen in Table 6.9(B). Thus, the null hypothesis was rejected only in regard to respondents' work departments and accepted for the other factors.

Table 6.9(C): Distribution of teaching staff by college location and full computer course training

Teacher College	Full course(s) computer training				Chi square value
	Yes		No		
	Freq.	%	Freq.	%	P=0.046
Riyadh TC	15	37.5	25	62.5	
Dammam TC	5	33.3	10	66.7	
Taif TC	5	13.5	32	86.5	
Tabouk TC	7	35.0	13	65.0	
Jazan TC	5	14.3	30	85.7	

The associations between respondents' having attended each of the three main computer-training types (workshop, short training and full course training) and their personal characteristics were tested by the use of chi square. No significant associations were found except in the case of full course training, which was significantly associated with college location at < 0.05 and respondents in Taif and Jazan TCs indicated less attendance to full course computer training as seen in Table 6.9(C).

6.5.1.4. <u>Place of computer training:</u>

Respondents were asked about the place where training had occurred and an option of "Had no training" was added for those had no computer training at all.

Table 6.10: The place of computer training and the distribution of respondents

Places of training	Yes		No	
	Freq.	%	Freq.	%
At high school	3	2.1	143	97.9
At the university	38	25.9	109	74.1
At college	22	15.0	125	85.0
Private training	24	16.3	123	83.7
Self training	45	30.6	102	69.4
Had no training	38	25.9	109	74.1

The results, as seen in Table 6.10, revealed that about a quarter of TS had trained at universities, 30% taught themselves in their spare time, 16% were trained in private institutes, 15% at the college and only 3% at high school and a quarter had no any computer training at all. The percentages of respondents exceeded the actual number of respondents, since some respondents indicated training in more than one place.

6.5.1.5. Purpose of computer use:

About one third of respondents indicated that they did not use computers at all, when they were asked about their usual purposes in using computers.

Table 6.11(A): The purpose of using computers

Use Computers for	Freq.	%
Work	62	42.2
Leisure	4	2.7
Both (work & leisure)	38	25.9
No computer use	43	29.3

The results in Table 6.11(A), for the three other options, show that about 42% of respondents used computers only for work, about 25% for both work and leisure and only about 3% (4 respondents) chose the leisure option. The option of using computers for leisure was removed from further analysis since only a small proportion of respondents indicated this option. The other options, using for work, using for both work and leisure and no use at all, were cross tabulated and the chi square test was applied to test the null hypothesis that:

There is no significant association between respondents' purpose of using computers and their personal characteristics.

Table 6.11 (B): The association between respondents' purpose of computer use and their work departments

Work departments	Work		Work & leisure		No computer use		Chi square value
	Freq.	%	Freq.	%	Freq.	%	P=0.001
Theoretical departments	8	29.0	5	18.0	15	53.0	
Practical departments	9	30.0	13	43.0	8	27.0	
Scientific departments	16	59.0	10	37.0	1	4.0	
Educational departments	22	44.0	10	20.0	18	36.0	

The results, as seen in Table 6.11 (B), show a significant association between respondents' purpose of computer use and their work departments. Therefore, the null hypothesis was rejected only with regard to work departments, and accepted for the other personal characteristics.

6.5.1.6. Availability of access to computers:

Regarding the availability of access to computers, Table 6.12(A), indicates that about one third of respondents revealed that they did not have any access to computers. About another third had access to computers at the college where they worked, about half the respondents had access at home, and 12% shared access to computers with their friends.

Table 6.12(A): Teaching staff and availability of access to computers

Availability of access to computes	Yes		No	
	Freq.	%	Freq.	%
At college	50	35.0	93	65.0
At home	63	44.1	80	55.9
Sharing with a friend	18	12.6	125	87.4
Not available	42	29.4	101	70.6

The responses add up to more than 100%, since some respondents had access to computers in more than one place. The number of respondents having no access to computers was consistent with the number of non-computer users in the previous item. These findings support the validity of the data obtained.

Respondents who had no access to computers were cross tabulated with their demographic characteristics to test the null hypothesis that:

There is no significant association between respondents' having no access to computers at all and their personal characteristics.

Table 6.12(B): The association between respondents who had no access to computers at all and their work departments

Work departments	Had no access to computers at all				Chi square value
	Yes		No		
	Freq.	**%**	**Freq.**	**%**	**P=0.022**
Theoretical departments	**12**	**42.9**	**16**	**57.1**	
Practical departments	**6**	**20.0**	**24**	**80.0**	
Scientific departments	**4**	**13.3**	**26**	**86.7**	
Educational departments	**20**	**39.2**	**31**	**60.8**	

The results, as seen in Table 6.12(B), show that there is a significant association between respondents' having no access to computers at all among their work departments. Thus, the null hypothesis was rejected only in regard to this factor and accepted in regard to other personal characteristics, where no significant associations were found.

Further investigations were carried out to test the relationship between respondents' having access to computers at college, at home or sharing access to computers with friends, with their personal characteristics. Chi square tests were applied to test the following null hypotheses:

There is no significant association between respondents' having access to computers at college and their personal characteristics.

There is no significant association between respondents' having access to computers at home and their personal characteristics.

There is no significant association between respondents' sharing access to computers with friends and their personal characteristics.

Table 6.12(C): The association between respondents' having access to computers at college and their work departments

Work departments	Had access to computers at college				Chi square value
	Yes		No		
	Freq.	%	Freq.	%	P=0.0 01
Theoretical departments	3	10.7	25	89.3	
Practical departments	13	43.3	17	56.7	
Scientific departments	17	56.7	13	43.3	
Educational departments	14	27.5	37	72.5	

The results seen in Table 6.12(C) show a high significant association between respondents' having access to computers at college and their work departments. Whereas only one out of ten of respondents in the TD had access to computers, more than half of respondents in the SD, about half in the PD and about a quarter in the ED had the same. Thus, the null hypothesis related to work departments was rejected and accepted in relation to the other characteristics.

Table 6.12(D): The association between respondents who had shared access to computers with friends and their work departments

Work departments	Sharing access to computers with friends				Chi square value
	Yes		No		
	Freq.	%	Freq.	%	P=0.0 18
Theoretical departments	7	25.0	21	75.0	
Practical departments	6	20.0	24	80.0	
Scientific departments	1	3.3	29	96.7	
Educational departments	3	5.9	48	94.1	

Respondents' sharing access to computers with friends was also associated significantly with their work departments. However, the associations were, as seen in Table 6.12(D), the reverses of to the previous results in relation to availability of access at college (Table 6.12C). Whereas about one quarter of respondents in the TD and one fifth in the PD indicated sharing access to computers with friends, less than 6% of respondents in the SD and ED indicated that. These results led to the rejection of the null hypothesis and accepted for the other characteristics, since no association were discovered.

No significant association was found between personal characteristics and respondents' having access to computers at home, since the chi square value was >0.05. Therefore, the null hypothesis related to that was accepted.

The associations between those respondents having access to computer at college, at home and sharing access to computers with friends and their experience with computers were investigated to test the following null hypotheses:

There is no significant association between respondents' having access to computers at college, at home or sharing access to computer with friends and their experience with computers.

Table 6.12(E): The association between respondents' having access to computers at college, at home or sharing with friend and their computer experience

Access to computers		Had experience with computers				Chi square value
		Yes		No		
		Freq.	%	Freq.	%	
Available at college	Yes	46	90.2	5	9.8	P=0.004
	No	66	68.8	30	31.3	
Available at home	Yes	62	95.4	3	4.6	P=0.000
	No	50	61.0	32	39.0	
Sharing with friends	Yes	15	83.3	3	16.7	P=0.44
	No	97	75.2	32	24.8	

Table 6.12 (E) shows that there are significant associations between those respondents' having access to computers at college or at home with their computer experience, where respondents who had access to computers at college and at home expressed more computer experience than those without. On the other hand, no significant association was found between respondents' having shared access to computers with friends and their computer experience. Thus, the null hypotheses related to having access to computers at college or at home were rejected, while the one related to sharing access with friends was accepted in relation to respondents' experience with computers.

6.5.1.7. Average number of hours spent working on computers:

Related to their purposes in using computers and availability of access to computers, respondents were asked about the average number of hours spent working on computers weekly.

Table 6.13 (A): Average hours spent working on computers per week

Hours using computer	Freq.	%
0	58	40.0
1-3	52	35.9
4+	35	24.1

The results are shown in Table 6.13 (A). The values in the table indicate that the use of computers by respondents is very low, since three quarters of respondents expressed computer use of less than 4 hours weekly or no use at all. The percentage of computer non-users in this item was about 40%, which is higher than the percentage of non- users appearing from the previous items, the purpose of computer use and access to computers, where about 29% indicated that they did not use computers and a similar percentage revealed that they had no access to computers at all. The differences between the three groups, computer non-users, respondents having lack of access to computers and 0 hours computer users, might come from the fact that some respondents might use computers, but only rarely, amounting to less than 1 hour per week.

More investigations were carried to examine the associations between those TS who had access to computers at college, at home, sharing access to computers with friends and with the duration hours spent using computers weekly to test the following null hypotheses:

> ***There is no significant association between respondents having access to computers at college, at home or sharing with friends and the duration hours spent on computer use in an average week.***

Table 6.13(B): The association between teaching staff having access to computers at college, at home or sharing with friend and the duration hours spent on computer use weekly

Availability of computer		Duration of computer use						Chi square value
		0- Hour		**1-3 Hours**		**4+ Hours**		
		Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**	
At college	**Yes**	**13**	**26.0**	**20**	**40.0**	**17**	**34.0**	**P=0.028**
	No	**45**	**47.4**	**32**	**33.7**	**18**	**18.9**	
At home	**Yes**	**9**	**13.8**	**28**	**43.1**	**28**	**43.1**	**P=0.000**
	No	**49**	**61.3**	**24**	**30.0**	**7**	**8.8**	
Sharing with friends	**Yes**	**5**	**29.4**	**9**	**52.9**	**3**	**17.6**	**P=0.30**
	No	**53**	**41.4**	**43**	**33.6**	**32**	**25.0**	

The results as seen in Table 6.13 (B), revealed significant associations between those TS who had access to computers at college, at home and the duration hours spent working in computers in an average week. Those TS who had such access to computers expressed more duration hours working in computers weekly than those without, but no significant association was found between TS who shared access to computers with friends and the average hours spent weekly working on computers. Thus, hypotheses related to having access to computers at college and at home were rejected, while hypothesis related to sharing access to computers with friends was accepted in relation to the average hours respondents spent weekly working on computers.

Respondents' duration of computer use was cross tabulated with their personal characteristics and a chi square test was applied to test the null hypothesis that:

There is no significant association between respondents' duration of computer use and their personal characteristics.

No significant associations were found; thus, the null hypothesis was accepted.

6.5.1.8. Respondents' familiarity with computer applications:

In regard to familiarity with computer applications, respondents were asked about their practical use of and familiarity with computer applications such as Word Processing, Data base management, Record keeping, Spreadsheet, Accounting, Programming, Graphics, Instructional Programs and Desktop Publishing. A further response option was, "I cannot use any of these applications".

Table 6.14 (A): Computer applications and respondents' distribution

Computer applications	Yes		No	
	Freq.	%	Freq.	%
Word Processing	80	54.4	67	45.6
Data Base	33	22.4	114	77.6
Record Keeping	41	27.9	106	72.1
Spreadsheet	32	21.8	115	78.2
Accounting	10	6.8	137	93.2
Programming	29	19.7	118	80.3
Graphics	46	31.3	101	68.7
Instructional Programming	39	26.5	108	73.5
Desk-top Publishing	21	14.3	126	85.7
None of the above	45	30.6	102	69.4

The results in Table 6.14 (A) revealed that more than half of respondents expressed familiarity with Word-processing, one third with Graphics, about a quarter with each of Record Keeping and Instructional Programming, and about one fifth with each of Data Base management, Spreadsheet and Programming. Accounting and Desktop Publishing were the applications least known by respondents, since only 8% and 13% of respondents respectively were familiar with these two applications. About one-third of all respondents indicated that they were not familiar with any of these applications. Respondents who were not familiar with any of the computer applications were close in number to those not using computers, and to those had no access to computers.

The association between word processing, as the most popular application among respondents, and their personal characteristics were investigated to test the null hypothesis that:

There is no association between respondents' familiarity with word processing and their personal characteristics.

Table 6.14(B): The association between respondents' familiarity with word processing and their work departments

Work departments	Familiarity with word processing				Chi square value
	Yes		No		
	Freq.	%	Freq.	%	P=0.000
Theoretical departments	8	28.6	20	70.4	
Practical departments	12	40.0	18	60.0	
Scientific departments	27	90.0	3	10.0	
Educational departments	29	56.9	22	43.1	

The results of the cross tabulation as seen in Table 6.14 (B) show that a significant association was found between respondents' work departments and familiarity with word processing. Respondents in SD indicated more familiarity with word processing than respondents in the other departments. This result was no surprise since respondents in the SD expressed more computer experience, used computers more and had more access to computers at college and at home. Therefore, the null hypothesis was rejected only in regard to work departments and accepted in relation to respondents' other characteristics.

The association between respondents expressed familiarity with word processing and those who have access to computers at college, at home and share with friends was examined to test the null hypothesis that:

> ***There is no significant association between respondents' familiarity with word processing and their having access to computers at college, at home and sharing access to computers with friends.***

Table 6.14(C): The Association between respondents' familiar with word processing and those having access to computers at college, at home or sharing with friend

Access to computers		Familiarity with word processing				Chi square value
		Yes		No		
		Freq.	%	Freq.	%	
Available at college	Yes	36	70.6	15	29.4	P=0.004
	No	44	45.8	52	54.2	
Available at home	Yes	54	83.1	11	16.9	P=0.000
	No	26	31.7	56	68.3	
Sharing with friends	Yes	6	33.3	12	66.7	P=0.055
	No	74	57.4	55	42.6	

Significant associations were found between availability of access to computers at college or at home and familiarity with word processing, as seen in Table 6.14 (C). Those respondents who had access to computers at college or at home expressed more familiarity with word processing. Thus, the null hypothesis in relation to having access to computers at college or at home is rejected and accepted, on the other hand, in relation to sharing access to computers with friends concerning familiarity with word processing.

6.5.1.9. Respondents' computer course format and topic preferences:

As part of the investigation, TS were asked about the computer training course format that they would prefer.

Table 6.15: Respondents' selections for computer training course format

Computer course format	Freq.	%
Short Course (6-10 weeks)	33	22.6
Optional One Term Course	44	30.1
Compulsory One Term Course	68	46.6
No need for computer course	1	.7

The results are shown in Table 6.15. About half of the respondents preferred the choice of a compulsory one- term computer course, about one third preferred an optional one term computer course, about one fifth preferred a short training course and only one respondent did not want to have any computer training.

After omitting the last option, the respondents' choices of computer course types were cross tabulated with their personal characteristics and chi square tests were applied to test the null hypothesis that:

> ***There is no significant association between respondents' selections of computer training course format and their personal characteristics.***

No significant associations were found between respondents' selections of computer course format and their characteristics. Thus, the null hypothesis was accepted.

Related to the computer training course formats and the respondents' opinions, participants were asked to express their computer training desires and class interest.

Table 6.16: Respondents' computer training class interest

Computer Interest	Freq.	%
Have taken computer class and feel no need for more	7	4.8
Interested in taking a computer class	132	89.8
Not interested in taking any computer class	8	5.4

The results, as seen in Table 6.16, show a very high level of interest in taking a computer class, since only 5% of respondents were not interested in taking any computer courses and only another 5% felt that, having taken a computer class, they did not need any more.

After collapsing the first option with the third option in the variable of computer class interest, because of the small numbers of each, the respondents' indications were cross tabulated with their personal characteristics and chi square tests were applied to test the null hypothesis that:

There is no significant association between respondents' computer training class interest and their personal characteristics.

No significant association was found between respondents' computer training interest and their personal characteristics. Thus, the null hypothesis was accepted.

6.5.1.10. Source of Learning about Computers:

Respondents were asked, in relation to their computer experience, about the sources of their learning about computers.

Table 6.17(A): Respondents' sources of computer learning

Sources of learning about computers	Yes		No	
	Freq.	**%**	**Freq.**	**%**
Friends	**52**	**35.4**	**95**	**64.6**
Books	**45**	**30.6**	**102**	**69.4**
Course work	**41**	**27.9**	**106**	**72.1**
Newspapers and computer magazines	**29**	**19.7**	**118**	**80.3**
Colleagues	**26**	**17.7**	**121**	**82.3**
Computer Centre	**26**	**17.7**	**121**	**82.3**
Video and Television	**13**	**8.8**	**134**	**91.2**

As seen in Table 6.17(A), about one third of respondents indicated that they had learned about computers from their friends and/or from books, while about a quarter had learned from course work and about a fifth from colleagues, computer magazines and newspapers and from computer centres. The video and TV had been sources of computer information for less than 10% of respondents.

Table 6.17 (B): Summary of significant associations between sources of learning about computers and respondents' characteristics

Sources of learning about computers	Factors	Chi square value
Course work	**Work departments**	**P=0.000**
Friends	**Work departments** **Place of study**	**P=0.000** **P=0.017**
Computer Centre	**Nationality**	**P=0.035**
Books	**Work departments**	**P=0.046**

Cross-tabulation was carried out to test the significant associations between respondents' sources of learning about computers and their demographic characteristics. Several significant associations were found, as summarised in Table 6.17(B). Whereas no one in the TD and only less than one fifth of respondents in the PD learned about computers from course work, about one third of respondents in the ED and about half in the SD learned from this source (Table 6.17, C).

Table 6.17(C): The association between learning about computers from course work and respondents' work departments

Work departments	Learning about computers from course work				Chi square value
	Yes		**No**		
	Freq.	**%**	**Freq.**	**%**	**P=0.00**
Theoretical departments	**0**	**00**	**28**	**100**	
Practical departments	**5**	**16.7**	**25**	**83.3**	
Scientific departments	**14**	**46.7**	**16**	**53.3**	
Educational departments	**18**	**35.3**	**33**	**64.7**	

Learning about computers from books was more common among respondents in the SD, whereas about half of whom mentioned that they had learned about computers from books, about one quarter of respondents in the other departments revealed that (Table 6.17.D).

Table 6.17(D): The association between learning about computers from books and respondents' work departments

Work departments	Learning about computers from books				Chi square value
	Yes		No		
	Freq.	%	Freq.	%	
Theoretical departments	7	25.00	21	75.00	P=0.046
Practical departments	8	26.70	22	73.30	
Scientific departments	15	50.00	15	50.00	
Educational departments	11	21.60	40	78.40	

The situation of learning from friends took the opposite direction; whereas about three quarters of respondents in the TD and about half of respondents in the PD indicated that they relied on this source, friends, to learn about computers, only one fifth of respondents in the SD and ED indicated that.

Table 6.17(E): The association between learning about computers from friends and respondents' work departments

Work departments	Learning about computers from friends				Chi square value
	Yes		No		
	Freq.	%	Freq.	%	
Theoretical departments	22	78.6	6	21.4	P=0.00
Practical departments	13	43.3	17	56.7	
Scientific departments	6	20.0	24	80.0	
Educational departments	10	19.6	41	80.4	

The situation with regard to learning from computer centres varied according to nationality, as seen in Table 6.17(F).

Table 6.17(F): The association between learning about computers from computer centre and respondents' nationality

Nationality	Learning about computers from computer centres				Chi square value
	Yes		No		
	Freq.	%	Freq.	%	
Saudi	6	9.8	55	90.2	P=0.036
Non-Saudi	20	23.3	66	76.7	

Whereas about one third of non- Saudi respondents learned about computers from computer centres in the TC where they worked or perhaps in the schools where they studied, only one out of ten Saudi respondents learned from this source. These variations might happen, because most of the non- Saudi respondents worked in the SD, where more computer facilities were available. Therefore, the association between the respondents' work departments and their nationality was tested to examine the following null hypothesis:

There is no significant difference between respondents' work departments in relation to their nationality.

Table 6.17 (G): The association between respondents' work departments and their nationality

Work departments	Nationality				Chi square value
	Saudi		Non-Saudi		
	Freq.	%	Freq.	%	
Theoretical departments	17	60.7	11	39.3	P=0.003
Practical departments	6	20.0	24	80.0	
Scientific departments	9	30.0	21	70.0	
Educational departments	27	52.9	24	47.1	

A significant association, as seen in Table 6.17 (G), was found between the respondents' work departments and their nationality, where more non-Saudi respondents were available in the SD and in the PD, where more computer experience, computer use and access to computers were available. Therefore, the null hypothesis above was rejected.

6.5.2. Knowledge about computers:

To assess respondents' knowledge about computers, seven items about computer knowledge were presented with five different statements following each item, of which one was correct, three were incorrect and the fifth statement was for respondents who could not answer at all. Respondents were asked to choose the best answer for each of these statements. Table 6.18 (A) shows the results.

Table 6.18 (A): Knowledge items and respondents' distribution

Knowledge statements	Right		Wrong		Don't know	
	Freq.	%	Freq.	%	Freq.	%
1) Computers are not good for tasks that require intuition	87	59.2	26	17.7	34	23.1
2) The main duty of a computer programmer is to prepare instructions for a computer	81	55.1	29	19.7	37	25.2
3) Computer software is a term that describes a computer program	94	63.9	15	10.2	38	25.9
4) The physical parts of computer are referred to as hardware	98	66.7	9	6.1	40	27.2
5) A computer program is a set of instructions to control the computer	80	54.8	25	17.1	146	28.1
6) An operating computer follows a set of instructions written by people	99	67.8	22	15.1	25	17.1
7) A computer needs to solve a problem the name of the program and user number	75	51.4	42	28.8	29	19.9

A score of 1 was given to each correct answer and the score for each respondent was calculated. Since the knowledge section consisted of seven items, the results were tabulated with eight cells. The first cell represented participants who answered all items wrongly (no correct answer). In the second cell, respondents who answered only one item correctly were represented, and in the third cell, respondents who answered two items correctly were represented and so forth until the eighth cell. The last cell represented respondents who answered all items correctly (seven items).

Table 6.18(B): Level of correct response for Knowledge items

Value Label	Frequency	Percent
No correct	13	8.8
1- Item correct	11	7.5
2 Items correct	12	8.2
3 Items correct	14	9.5
4- Items correct	20	13.6
5- Items correct	25	17.0
6- Items correct	32	21.8
7- Items correct	20	13.6

Table 6.18(B), shows the frequencies and the percentages of respondents according to the number of items answered correctly.

Because of the small numbers in some cells and for statistical purposes, the numbers of the correct answers were collapsed to three groups instead of eight. Items from no correct up to two correct items were gathered in one group, three correct items and four correct items were gathered in the second group, while five correct items, six correct items and seven correct items made up the third group (Table 6.19A).

Table 6.19 (A): The computer knowledge test items groups

Number of correct items	Freq.	%
0-2 items correct	36	24.5
3-4 items correct	34	23.1
5-7 items correct	77	52.4

These totals were cross tabulated with different variables such as the personal characteristics of respondents, the computer experience, the purpose of computer use and computer ownership, to test the associations between the TS's computer knowledge and these variables. Chi- square tests were applied to test the following null hypotheses:

There are no significant differences between teaching staff who answered two items or less correctly, those who answered three or four items correctly and those who answered five or more items correct in relation to their personal characteristics.

There are no significant differences between teaching staff who answered two items or less correctly, those who answered three or four items correctly and those who answered five or more items correctly in relation to their computer experience.

There are no significant differences between teaching staff who answered two items or less correctly, those who answered three or four items correctly and those who answered five or more correctly in relation to their use of computers.

There are no significant differences between teaching staff who answered two items or less correctly, those who answered three or four items correctly and those who answered four or more correctly in relationship to the ownership of computers.

Table 6.19(B): The associations between teaching staff's number of correct items in the computer knowledge section and their work departments

Department of work	Number of correct items in the computer knowledge section						Chi square value
	0-2 correct		**3-4 correct**		**5-7 correct**		
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**	**P=0.001**
Theoretical departments	**11**	**39.3**	**7.0**	**25**	**10**	**35.7**	
Practical departments	**4**	**13.3**	**12**	**40.0**	**14**	**46.7**	
Scientific departments	**4**	**13.3**	**1**	**3.3**	**25**	**83.3**	
Educational departments	**16**	**31.4**	**13**	**25.5**	**22**	**43.1**	

The results of the cross tabulation led to the rejection of the null hypothesis only in relation to respondents' work departments, where significant association was found; (Table 6.19B). In regard to the other personal characteristics, e.g. college location, nationality, qualification, place of study and age, no significant associations were found, in these instances the null hypothesis was accepted.

Table 6.19(C): The associations between teaching staff's number of correct items in the computer knowledge section and their computer experience, computer use and availability of access to computer at college or at home

Respondents' computer experience, use and ownership	Number of correct items in the computer knowledge section							Chi square value
		0-2 correct		3-4 correct		5-7 correct		
		Freq.	%	Freq.	%	Freq.	%	
Had experience with computer	Yes	11	9.8	28	25.0	73	65.2	P=0.000
	No	25	71.4	6	17.1	4	11.4	
Use computer for work or leisure	Yes	11	10.6	21	20.2	72	69.2	P=0.000
	No	25	58.1	13	30.2	5	11.6	
Availability of computer at college	Yes	6	11.8	14	27.5	31	60.8	P=0.033
	No	30	31.3	20	20.8	46	47.9	
Availability of computer at home	Yes	5	7.7	9	13.8	51	78.5	P=0.000
	No	31	37.8	25	30.5	26	31.7	

The outcome of the cross tabulation of the number of correct answers by TS in the knowledge test with the variables e.g. computer experience, computer use and availability of access to computers at college or at home, shows significant associations. Those TS, who had computer experience, used computers and had access to computers at college or at home answered more items correctly than those that did not.

6.5.3. Computer training needs:

In this section of the questionnaire, respondents were given a list of computer-related topics and were asked to indicate their level of training need for each topic. A 4-point Likert-type scale was used: 4 representing a "Great Need;" 3 representing "Some Need;" 2 representing "No Need" and 1 representing an inability to answer the question.

Table 6.20(A): Frequency of topics needed for computer training

Computer training topics	No Answer 1		No need 2		Some Need 3		Great Need 4	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
16) Knowing how to benefit from Internet	8	5.4	7	4.8	15	10.2	117	79.6
1) Knowing about programming	1	0.7	14	9.5	31	21.1	101	68.7
2) Knowing how to get Information in and out of a computer	1	0.7	20	13.7	26	17.8	99	67.8
8) Knowing how to use computer to help with class housekeeping	2	1.4	16	10.9	34	23.1	95	64.6
3) Knowing how to select educational software	1	0.7	16	11.0	39	26.7	90	61.6
13) Knowing how to use Word Processing	8	5.5	12	8.2	38	26.0	88	60.3
15) Knowing how to use computer for presentation	5	3.4	16	10.4	38	25.9	88	59.9
7) Knowing how to use computer as a means of teaching problem solving	3	2.1	16	10.9	41	28.1	84	57.5
12) Knowing how to use spreadsheet	5	3.4	16	10.9	45	30.6	81	55.1
9) Knowing how to use computer to evaluate students	3	2.0	19	12.9	48	32.7	77	52.4
14) Knowing how to use Database management	7	4.8	16	10.9	51	34.9	72	49.3
11) Knowing how to use Multimedia	11	7.5	14	9.6	51	34.9	70	47.9
6) Knowing how to use a computer as a high interest drill and practice vehicle	4	2.7	24	16.3	49	33.3	70	47.6
10) Knowing how to apply the computer to diagnose students' abilities	6	4.1	28	19.2	49	33.6	63	43.2
5) Learning about the role of computer in society	6	4.1	33	22.4	64	43.5	44	29.9
4) Learning about the history & the development of computer	4	2.7	64	43.8	53	36.3	25	17.1

The ratings for all computer-training topics are listed in sequence in Table 6.20(A), in regard to the choice of Great Need. The results revealed that the topic most frequently indicated by respondents as one of which they had Great Need, was knowing how to benefit from the Internet, while the topic least often seen as a Great Need was "know about computer history and development".

Chi square tests were applied to test the null hypothesis that:

There are no significant associations among respondents' assessment of the computer training need topics and the availability of access to computers at college.

Table 6.20(B): The associations between respondents' assessment of computer training need topics and the availability of access to computers

Availability of computers	Computer training need topics	Chi square value
Having access to computers at college	**Knowing about programming**	**P=0.035**
Having access to computers at home	**Get information in and out of computers**	**P=0.08**

To avoid empty cells, or cells containing only small numbers, since only 5% or fewer respondents used the rating value "No Answer" (see Table 6.20A), that option was dismissed from the rating scale, as a missing value.

The results of the cross tabulation after that revealed that only two topics were associated significantly with availability of access to computers, as summarised in Table 6.20(B).

Table 6.20(C): The associations between respondents' assessment of "Knowing about programming" and the availability of computers at college

Respondents' assessments	Computer available at college				Chi square value
	Yes		**No**		
	Freq.	**%**	**Freq.**	**%**	
No Need	**9**	**17.6**	**5**	**5.3**	**P=0.035**
Some Need	**12**	**23.5**	**19**	**20.0**	
Great Need	**30**	**58.8**	**71**	**74.7**	

Whereas about 18% of respondents having access to computers at college rated the topic *Knowing about programming* as "No Need" and half rated it with "Great need", only 5% of those who had no access to computers at college rated the same topic with "No Need" and about three quarters with "Great Need" (Table 6.20.C). These variations might come as a result of respondents with access to computers already being aware of other computer uses than just programming, such as using other applications. Therefore, the association between those who expressed unfamiliarity with computer applications and the availability of computers at college was cross- tabulated to test the following hypothesis:

There is no significant difference between those respondents having access to computers at college and those not having access in relation to their inability to use computer applications.

Table 6.20(D): The associations between respondents' ability to use computer applications and availability of computers at college

I cannot use any of the computer applications listed	Computer available at college				Chi square value
	Yes		No		
	Freq.	%	Freq.	%	
Yes	6	13.3	39	86.7	P=0.000
No	45	44.1	57	55.9	

The results of the cross-tabulation as seen in Table 6.27 (D) indicated that whereas only small numbers (6) of those respondents having access to computers at college expressed inability to use any of the computer applications listed, about half of those respondents having no access to computers at college were unable to do so. Moreover, part of the other half, who indicated ability to use the computer applications listed, may have had access to computers at home or in other places, such as friends.

Table 6.20(E): The associations between respondents' assessment of " Get information in and out of computers" and the availability of computers at home

Respondents' assessments	Computer available at home				Chi square value
	Yes		No		
	Freq.	%	Freq.	%	
No Need	15	23.4	5	6.2	P=0.00
Some Need	12	18.8	14	17.3	
Great Need	37	57.8	62	76.5	

Respondents having access to computers at home differed significantly from those not having access in rating the topic *knowing about getting information in and out of computers*. Whereas three quarters of respondents having no access to computers at home rated this topic with "Great Need" and only 6% with "No Need", about half of those having access to computers at home rated this topic with "Great Need" and a quarter with "No Need" (Table 6.20E). It is interesting, and even worrying, that such a high proportion of respondents with really access to computers lacked confidence in their ability even to input and retrieve data, though those without home access to computers appeared to fare even worse in this respect.

No significant associations were found between respondents' rating of other computer training topics among these two variables, having access to computers at home or at college. Thus, the null hypothesis was rejected in relation to assessment of the computer training need topics mentioned above and the availability of access to computers at home, at college and via friends, but accepted for the remaining computer training topics.

Chi square tests were applied to test the two following null hypotheses:

There is no significant association between respondents' assessment of the computer training topics and their computer experience.

There is no significant association between respondents' assessment of the computer training topics and their interest in computer training class.

The same procedures were used; the "No Answer" option was omitted from all items, and the two variables, computer experience and interest in computer class, were cross- tabulated with the respondents' assessment of computer training need topics. Moreover, those respondents who had experience with different type of computers grouped together in one group called "Have computer experience".

A significant difference between respondents who had computer experience and those who did not was found for only one topic: "*Knowing about the history and development of computer*" with a probability of 0.01, as seen in Table 6.27F.

Table 6.20(F): The associations between respondents' assessment of " Knowing about the computer history & development" and the familiarity with computers

Respondents' assessments	Respondents having computer experience				Chi square value
	Yes		No		
	Freq.	%	Freq.	%	
No Need	55	50.5	9	27.3	P=0.01
Some Need	40	36.7	13	39.4	
Great Need	14	12.8	11	33.3	

Whereas half of respondents having experience with computers reported "No Need" for this topic and about 12% of the same respondents reported "Great Need", more than a quarter of respondents who did not have computer experience rated this topic as "No Need" and about one third rated it as a "Great Need". In other words: respondents who had no computer experience were more interested to know about the computer's history and development.

When the respondents' ratings for the computer need topics were cross-tabulated with their interest in computer classes, the outcome came with many cells empty or containing small numbers. Therefore the two groups, respondents who were not interested in taking any computer classes and respondents who said that they had taken computer courses and did not need any more, were combined in one cell and respondents who thought they needed to have computer courses remained in the other cell. The variable so created was cross- tabulated with the respondents' assessment of the computer training topics and the chi square test was applied. The results indicated that there were significant differences in respondents' assessment between the two groups for almost all items. The only few exceptions, where no significance differences were found, were item four, *"Learn about the history and development of computers"*; item five, *"Learn about the role of computers in society"* and item 10 *"Knowing how to apply the computer to diagnose students' needs"*. Whereas respondents interested in taking a computer class rated all these topics, other than the three exception topics, with "Great Need" and only a small proportion of them rated these topics with "No Need", the reverse pattern was found among respondents not interested in computer classes. Therefore, the null hypothesis was rejected for all items except for the three items: item four, item five and item 10, the hypotheses were accepted.

6.6. Summary:

This chapter has presented the findings from the TS questionnaire, which surveyed respondents from 11 academic subject areas in five TCs. It began by presenting respondents' biographical data. Non- Saudis made up 59% of the sample, and many staff, irrespective of nationality, had studied abroad.

Level of computer experience and use were found to be generally low. About a quarter of the sample had no experience at all, more than a third had not received any computer training, and about a third had no access to computers. All respondents except one were interested in receiving some form of computer training.

Knowledge of computers was weak. Only 13.6% of respondents answered all seven knowledge items correctly and about 9% did not get any correct answer. Not surprisingly, respondents' computer knowledge was significantly associated with their experience, training and access; also, with work departments.

Respondents acknowledged a need for training in relation to several aspects of computer use, the main area of interest being the ability to benefit from the Internet.

The findings presented in this chapter suggest that TS, particularly those in TD, lack the computer knowledge they need to keep up-to-date with current developments in education. There is evidently a need for additional computer training, and the indications are that steps to provide such training would be well received by college staff. The implications of the findings presented so far will be discussed further in a later chapter.

The teacher college students' computer experience, computer use, their knowledge about computers and their assessment of the computer training need topics are investigated in the following chapter, so their perceptions may be compared with those of the TS.

CHAPTER SEVEN

STUDENTS' QUESTIONNAIRE ANALYSIS

CHAPTER 7

Students' Questionnaire Analysis

7.1 Introduction:

This chapter describes the TC student sample and their responses to the questionnaire. A full description is given of the student sample: their personal data, computer experience, knowledge about computers, and their computer training needs following the same structure as with the TS responses in Chapter 6. Data about the attitude scales are presented in the following chapter (Chapter 8).

7.2. Description of the sample:

Because of the time and effort involved in a study of this kind, and since the study was carried out only by the researcher and not sponsored, the same five TCs chosen to represent the TS sample were selected to represent the student teachers' sample.

Table 7.1: Number of students enrolling in the Teacher Colleges' sample in the school year of 1997-1998

Teacher Colleges	No of Students	%
Riyadh TC	1885	28.58
Dammam TC	886	13.43
Taif TC	1273	19.31
Tabouk TC	1201	18.21
Jazan TC	1350	20.47
Total	6595	100 .00

**Source: Direct statistical calculation from the Teacher Colleges*

As seen in Table 7.1,the five TCs, where the students' sample was drawn in the academic year of 1997-1998, served 6,595 students.

From each department of study, namely: Quranic Studies, Islamic Studies, Arabic Literature, Physical Education, Mathematics, Science and Art 20 students were selected randomly from each of the five TCs sample; Riyadh, Dammam, Taif, Tabouk and Jazan. Five cases from each level of study mentioned above plus another five students from Computer Studies department, which are available only in Riyadh and Dammam TCs for the first year. This gave a total of 710 students: 140 students from each TC, plus five students representing freshman students in the Computer Studies department available only in Riyadh and Dammam TCs. It should be noted that Social Studies departments were omitted because of the small number of students enrolled in this department of study in all TCs.

7.3. Description of student respondents and their demographic characteristics:

The same sets of questionnaires as were used for TS were used to collect data from TC students on the variables of computer experience and use, computer knowledge and computer training needs.

Table 7.2: The students' sample distribution, return and valid forms

Teacher College	Students Sample	Return forms	%	Valid	%
Riyadh TC	145	121	83.4	116	80.0
Dammam TC	145	114	78.6	97	66.8
Taif TC	140	102	72.8	91	65.0
Tabouk TC	140	92	65.7	54	38.5
Jazan TC	140	115	82.1	114	82.1
Total	710	544	76.7	472	66.4

As seen in Table 7.2 the number of questionnaire forms returned was 544, 77% of the forms distributed. Trainees in the In-service training programme for Head teachers in Tabouk TC completed 22 questionnaire forms, but their forms were omitted from the analysis, since these respondents were different in their characteristics and level of study from regular TC students. Furthermore, some questionnaire forms came back from these TCs with insufficient information or completed improperly. These forms, too, were excluded from analysis. Thus, the final sample used in analysis was 472 students (see Table 7.2).

Students in the demographic section were asked about factors that might affect their computer experience, such as college location, area of study, the students' level of study, age and high school certificate.

The researcher sought to distribute equal numbers of questionnaires to the five TCs according to the academic departments available in each college.

Table 7.3: Teacher college students' department of study distribution

Department of study	Freq.	%
Quranic Studies	59	12.6
Islamic Studies	55	11.7
Arabic Literature	66	14.0
Physical Education	65	13.8
Mathematics	81	17.2
Science	74	15.7
Art	60	12.8
Computer Studies	10	2.1

Similar levels of responses were obtained from all departments, as seen in Table 7.3, the only exception being Computer Studies, which accounted for less than 3% of responses. The low ratio from Computer Studies departments was attributable to the fact mentioned before, that Computer departments have been established only recently and only in three TCs, two of which, Riyadh and Dammam TCs, were included in the sample and only one level of study (Freshman). The two missing cases did not mention their departments of study.

Table 7.4: The students' demographic characteristics

Personal Characteristics		Freq.	%
College location	**Riyadh TC**	**116**	**24.6**
	Dammam TC	**97**	**20.6**
	Taif TC	**91**	**19.3**
	Tabouk TC	**54**	**11.3**
	Jazan TC	**114**	**24.2**
Department of studies	**Theoretical departments**	**183**	**38.9**
	Practical departments	**121**	**25.7**
	Scientific departments	**166**	**35.3**
Level of study	**Freshman**	**122**	**27.9**
	Sophomore	**101**	**23.1**
	Junior	**94**	**21.5**
	Senior	**120**	**27.5**
Qualification	**Science**	**261**	**55.4**
	Arts	**192**	**40.8**
	Teacher Training Institute	**18**	**3.8**
Age Group	**17-20**	**139**	**29.5**
	21-24	**288**	**61.1**
	25+	**44**	**9.4**

For statistical purposes and because of the similarity in nature of some departments, the students' departments of study were grouped into three major departments, as for TS: the theoretical departments (TD), covering Quranic, Islamic and Arabic divisions; the practical departments (PD) encompassing Physical Education and Art divisions and the scientific departments (SD) containing Mathematics, Science and Computer divisions. Their distribution by these departments as well, as their level of study, qualification and age group are shown in Table 7.4.

These respondents represented all four levels of study which are available in each

TC: the first level, "freshman", the second level "sophomore", the third level "junior" and the fourth level "senior", corresponding to undergraduate years 1-4 respectively in a U.K. university or college. Since equal numbers of questionnaires were distributed to each level of study, the respondents were fairly evenly distributed across the four levels, as seen in Table 7.4.

Regarding the age distribution of the sample, as Table 7.4 shows, 427students (91%) were between 17 and 24 years old, which is the normal age for college students, who usually enter college at age 18. The 44 students, who were 25 years old or more, might have entered college a little later, been mature students who had graduated from teacher training institutions and entered college to upgrade their qualifications, or failed to complete their study in four years, which is the regular time for obtaining the bachelor degree.

As seen in Table 7.4, 55% of the respondents were students who had graduated from high school with a Science background, 41% with an Arts background and only a small proportion had graduated from Teacher Training institutes. This result is consistent with the TCs' policy, where most places in TCs are allocated to students newly graduating from high school and only a few places are reserved for serving teachers wishing to upgrade their qualifications.

7.4. <u>The reliability of the instrument:</u>

Cronbach's Alpha was used to measure the reliability of the instrument on the three sections where it is applicable: the Knowledge section, the Computer Training Needs section and the Attitude section. The reliabilities of each scale for the Attitude section, ANXIETY, ENJOYMENT, NEED and WANT were tested separately. The attitude scales' reliability are discussed in the Chapter 8, when discussing these scales.

7.4.1. The reliability of the Computer Knowledge Section:

The Cronbach's Alpha procedure was applied to test the reliability of the Computer Knowledge section.

Table 7.5: Reliability of Computer Knowledge Section

No	The items	Item total correlation	Alpha if item deleted
1	**Computers are not good for tasks that require intuition**	**0.41**	**0.80**
2	**The main duty of a computer programmer is to prepare instructions for a computer**	**0.51**	**0.78**
3	**Computer software is a term that describes a computer program**	**0.55**	**0.77**
4	**The physical parts of computer are referred to as hardware**	**0.54**	**0.77**
5	**A computer program is a set of instructions to control the computer**	**0.63**	**0.76**
6	**An operating computer follows a set of instruction written by people**	**0.53**	**0.78**
7	**Computer needs, to solve a problem, the name of the program and user number**	**0.57**	**0.77**
N of Cases = **447**	**N of Items = 7**	**Alpha = 0.81**	

Alpha if item deleted shows that the removal of the two low –correlating items, items 1 and 2, would make no difference to the reliability of the scale, while the removal of any other item would have slightly reduced it.

7.4.2. Reliability of the Computer Training Need section:

The Alpha coefficient for the 16 items in the Computer Training Needs Scale was 0.88 and the item-scale correlations ranged from 0.37 for item 4 to 0.62 for item 15.

There were only two items (4 and 5) for which inter-correlation was lower than 0.4, but the correlation for each item was over 0.35.

Table 7.6: Reliability analysis of Computer Training Need section

No	Computer Training need items	Item total correlation	Alpha if item deleted
1	**Knowing about programming**	**0.54**	**0.87**
2	**Knowing how to get Information in and out of a computer**	**0.57**	**0.87**
3	**Knowing how to select educational software**	**0.57**	**0.87**
4	**Learning about the history & the development of computer**	**0.37**	**0.88**
5	**Learning about the role of computer in society**	**0.39**	**0.88**
6	**Knowing how to use a computer as a high interest drill and practice vehicle**	**0.48**	**0.88**
7	**Knowing how to use computer as a means of teaching problem solving**	**0.54**	**0.87**
8	**Knowing how to use computer to help with class housekeeping**	**0.50**	**0.88**
9	**Knowing how to use computer to evaluate students abilities**	**0.50**	**0.88**
10	**Knowing how to apply the computer to diagnose students' needs**	**0.50**	**0.88**
11	**Knowing how to use Multimedia**	**0.53**	**0.88**
12	**Knowing how to use spreadsheet**	**0.57**	**0.87**
13	**Knowing how to use Word Processing**	**0.59**	**0.87**
14	**Knowing how to use Database management**	**0.55**	**0.87**
15	**Knowing how to use computer for presentation**	**0.62**	**0.87**
16	**Knowing how to benefit from Internet**	**0.57**	**0.87**
N of Cases = 452	**N of Items = 16**	**Alpha = 0.88**	

Alpha if item deleted shows that the removal of the two low-correlating items (items 4 and 5) would have made no difference to the reliability of the scale, while the removal of any other item would have resulted in a slightly lower Alpha (see Table 7.6). Therefore, the scale can be considered reliable as a measure of the training need of TCs' students in SA.

7.5. Students' data analysis

As with the TS, the students' computer experience, computer knowledge, computer training needs and attitude toward computers were investigated, and the associations between these variables and the respondents' personal characteristics were tested.

7.5.1. Experience with computers:

In the first section of the questionnaire students were asked to express their experience with computers. Various items related to computer experience were included in this section.

7.5.1.1. Experience with types of Computer:

First of all, students were asked about their experience with three types of computer, with a fourth option listed for students who had no experience at all.

Table 7.7(A): Frequency of students' experience with computers

Type of Computers	Yes	
	Freq.	**%**
Experience with micro-computer	**269**	**57.0**
Experience with mini-computer	**53**	**11.2**
Experience with main frame computer	**11**	**2.3**
No experience with computers at all	**139**	**29.4**

As seen in Table 7.7(A), whereas about half of respondents had experience with microcomputers, and about one out of ten had experience with mini-computers, only 11 students had experience with mainframe computers and about one third had no computer experience. The large proportion of "no experience" answers was surprising, since students are taught about computers in the secondary school as part of the curriculum; the appearance of the subject on the curriculum, however, is no guarantee that students had the opportunity to gain practical computer experience.

Respondents who had experience with the three types of computer were collapsed in one group, and those who had not remained in the other. Students' computer experience was cross tabulated with their personal characteristics and chi square tests were applied to test the null hypothesis that:

> ***There is no significant difference between students who had computer experience and those who had no computer experience in regard to their personal characteristics, e.g. college location, department of study, level of study, previous secondary school certificate and their ages.***

Table 7.7(B): Association between students' experience with computers and their personal characteristics

Variables		Do you have experience with computers?				Chi square value
		Yes		No		
		Freq.	%	Freq.	%	
College location	**Riyadh TC**	84	72.4	32	27.6	P=0.83
	Dammam TC	67	69.1	30	30.9	
	Taif TC	64	70.3	27	29.7	
	Tabouk TC	35	64.8	19	35.2	
	Jazan TC	83	72.8	31	27.2	
Department of study	**Theoretical departments**	112	61.2	71	38.8	P=0.000
	Practical departments	79	65.3	42	34.7	
	Scientific departments	141	84.9	25	15.1	
Qualification	**Science**	204	78.2	57	21.8	P=0.000
	Art	116	60.4	76	39.6	
	Teacher Training Ins.	13	72.2	5	27.8	
Level of study	**Freshman**	104	85.2	18	14.8	P=0.000
	Sophomore	67	66.3	34	33.7	
	Junior	59	62.8	35	37.2	
	Senior	74	61.7	46	38.3	
Age group	**17-20**	116	83.5	23	16.5	P=0.000
	21-24	189	65.6	99	34.4	
	25+	27	61.4	17	38.6	

As seen in Table 7.7(B), significant associations were found between students' having computer experience and all of their personal characteristics, except college location. Students in the SD with science secondary school background and in the age range between 17-20 expressed more familiarity with computers than other students did. Thus, the null hypothesis was rejected except for college location.

7.5.1.2. Familiarity with Computer Languages:

Regarding students' familiarity with computer languages, the findings are presented in Table 7.8(A).

Table 7.8(A): Computer languages and students' distribution

Computer languages	Yes		No	
	Freq.	%	Freq.	%
BASIC	269	57.0	203	43.0
LOGO	2	.4	470	99.6
PASCAL	7	1.5	465	98.5
COBOL	2	.4	470	99.6
FORTRAN	5	1.1	467	98.9
Not familiar with computer languages	196	41.5	276	58.5

As Table 7.8(A) shows, whereas about 42% of all students indicated that they were unfamiliar with all computer languages listed, about 59% of the respondents expressed familiarity with BASIC, and less than 4% indicated familiarity with all other languages listed: LOGO, PASCAL, COBOL and FORTRAN. These variations among students were expected, since students in the secondary school just study an overview about computer languages with special emphasis on BASIC.

The associations between students' familiarity or otherwise with computer language, and their personal characteristics were investigated to test the null hypothesis that:

> ***There is no significant difference between respondents who were not familiar with computer languages and those who were in regard to their personal characteristics.***

Table 7.8(B): The associations between students' lack of familiarity with computer languages and their personal characteristics

Variables		Not familiar with any of these computer languages				Chi square value
		Yes		No		
		Freq.	%	Freq.	%	
College Location	Riyadh TC	49	42.2	67	57.8	P=0.73
	Dammam TC	43	44.3	54	55.7	
	Taif TC	39	42.9	52	57.1	
	Tabouk TC	24	44.4	30	55.6	
	Jazan TC	41	36.0	73	64.0	
Department of study	Theoretical departments	89	48.6	94	51.4	P=0.000
	Practical departments	62	51.2	59	48.8	
	Scientific departments	44	26.5	122	73.5	
Qualification	Science	87	33.3	174	66.7	P=0.000
	Art	100	52.1	92	47.9	
	Teacher Training Ins.	8	44.4	10	55.6	
Level of study	Freshman	29	23.8	93	76.2	P=0.000
	Sophomore	40	39.6	61	60.4	
	Junior	51	54.3	43	45.7	
	Senior	65	54.2	55	45.8	
Age group	17-20	32	23.0	107	77.0	P=0.000
	21-24	136	47.2	152	52.8	
	25+	28	63.6	16	36.4	

The results, as seen in Table 7.8(B), revealed significant associations between students' familiarity with computer languages and all their personal characteristics, except for college location. Again, students in the SD, those with a science secondary school background and those aged between 17-20 revealed more experience with computer languages than other students did. Thus, the null hypothesis was rejected in regard to all characteristics except college location.

The difference between students who were familiar with BASIC language and those who were not, was also examined and chi square tests were applied to test the null hypothesis that:

There is no significant difference between students who were familiar with BASIC language and those who were not in regard to their demographic characteristics.

Table 7.8(C): The associations between students' familiarity with BASIC computer language and their personal characteristics

Variables		Familiar with BASIC				Chi square value
		Yes		No		
		Freq.	%	Freq.	%	
College Location	**Riyadh TC**	**65**	**56.0**	**51**	**44.0**	**P=0.51**
	Dammam TC	**53**	**54.6**	**44**	**45.4**	
	Taif TC	**50**	**54.9**	**41**	**45.1**	
	Tabouk TC	**28**	**51.9**	**26**	**48.1**	
	Jazan TC	**73**	**64.0**	**41**	**36.0**	
Department of study	**Theoretical departments**	**93**	**50.8**	**90**	**49.2**	**P=0.000**
	Practical departments	**53**	**43.8**	**68**	**56.2**	
	Scientific departments	**122**	**73.5**	**44**	**26.5**	
Qualification	**Science**	**169**	**64.8**	**92**	**35.2**	**P=0.001**
	Art	**90**	**46.9**	**102**	**53.1**	
	Teacher Training Ins.	**10**	**55.6**	**8**	**44.4**	
Level of study	**Freshman**	**90**	**73.8**	**32**	**26.2**	**P=0.000**
	Sophomore	**59**	**58.4**	**42**	**41.6**	
	Junior	**45**	**47.9**	**49**	**52.1**	
	Senior	**52**	**43.3**	**68**	**56.7**	
Age group	**17-20**	**104**	**74.8**	**35**	**25.2**	**P=0.000**
	21-24	**149**	**51.7**	**139**	**48.3**	
	25+	**15**	**34.1**	**29**	**65.9**	

Similar results were found, as seen in Table 7.8(C). Significant associations were found between students' familiarity with BASIC language and all their personal characteristics except college location. These results led to the rejection of the null hypothesis above for all the students' personal characteristics except college location.

7.5.1.3. <u>Type of computer training respondents received:</u>

Students were asked about the type of computer training they had received, and given several pre- formulated answers from which to choose.

Table 7.9(A): Distribution of type by computer training

Computer training types	Yes		No	
	Freq.	**%**	**Freq.**	**%**
Workshop	**25**	**5.3**	**447**	**94.7**
Short training	**46**	**9.7**	**426**	**90.3**
Full Course(s)	**294**	**62.3**	**178**	**37.7**
Not trained on computer	**126**	**26.7**	**346**	**73.3**

As seen in Table 7.9(A) whereas 27% of all respondents had not received any computer training, two thirds of respondents indicated that they had been trained on a full course or courses, only a few respondents had attended a short training course and even fewer had attended a workshop for computer training.

The number of students who indicated that they had no computer experience in the previous item (139) was greater than that of students who revealed that they had not been computer-trained (128). The variations between the two responses might indicate that, even though some students had been computer trained, they felt that they were still unfamiliar with computers.

The fact that three quarters of all respondents were computer trained did not surprise the researcher, since, as mentioned previously, computer courses are part of the curriculum at secondary school, and one of the college requirements for Science and Mathematics students. However, the important thing is how much computer training did they receive? The answer to this question will be examined through the other items.

Students' computer training was cross tabulated with their personal characteristics and chi square tests were applied to test the null hypothesis that:

There is no significant association between students' having or not having computer training and their personal characteristics.

Table 7.9(B): The associations between students' lack of computer training and their personal characteristics

Students' personal characteristics		Had no computer training				Chi square value
		Yes		No		
		Freq.	%	Freq.	%	
College Location	Riyadh TC	49	42.2	67	57.8	P=0.73
	Dammam TC	43	44.3	54	55.7	
	Taif TC	39	42.9	52	57.1	
	Tabouk TC	24	44.4	30	55.6	
	Jazan TC	41	36.0	73	64.0	
Department of study	Theoretical departments	68	37.2	115	62.8	P=0.000
	Practical departments	37	30.6	84	69.4	
	Scientific departments	22	13.3	144	86.7	
Qualification	Science	47	18.0	214	82.0	P=0.000
	Art	75	39.1	117	60.9	
	Teacher Training Ins.	5	27.8	13	72.2	
Level of study	Freshman	21	17. 2	101	82.8	P=0.013
	Sophomore	32	31.7	69	68.3	
	Junior	26	27.7	68	72.3	
	Senior	42	35.0	78	65.0	
Age group	17-20	23	16.5	116	83.5	P=0.001
	21-24	87	30.2	201	69.8	
	25+	18	40.9	26	59.1	

The results in Table 7.9(B) revealed that there were significant associations between students' lack of computer training and all their personal characteristics except college location. Whereas about one-third of students in the TD and PD indicated no computer training, only 13% of students in the SD indicated that and whereas 18% or less in the first level of study, with science secondary school background and in the range age of 17-20 expressed no computer training, about one-third of the other students revealed that. Thus, the null hypothesis was rejected for all variables except college location.

7.5.1.4. Availability of access to computers:

Students were asked about their access to computers, at college, at home, and sharing with a friend. A fourth option was added for those who had no access to computers at all.

Table 7.10(A): The distribution of students and availability of access to computers

Availability of computers	Yes	%	No	%
	Freq.	**%**	**Freq.**	**%**
Computer available at the college	**63**	**13.3**	**409**	**86.7**
Computer available for me at home	**124**	**26.3**	**348**	**73.7**
Computer available with my friend	**113**	**23.9**	**359**	**76.1**
Computer not available for me at all	**193**	**40.9**	**279**	**59.1**

The results, as seen in Table 7.10(A) revealed that access to computers at college was available for only 13%, at home for a quarter and another quarter shared access to computers with friends, but 41% indicated that they had no access to computers at all. The number of respondents claiming no access to computers was higher than the number of those who indicated that they did not have any computer experience. The difference might come from the fact that some students might have had some computer experience (e. g. while at school), but access to computers was not available for them at the time of the study.

The associations between availability of access to computers and students' personal characteristics were examined and chi square tests were applied to test the null hypothesis that:

There is no significant association between availability of access to computers and students' personal characteristics.

Table 7.10(B): The associations between availability of access to computer and students' personal characteristics

Students' personal characteristics		Had no access to computer				Chi square value
		Yes		No		
		Freq.	%	Freq.	%	
Teacher college location	**Riyadh TC**	**42**	**36.2**	**74**	**63.8**	**P=0.019**
	Dammam TC	**32**	**33.0**	**65**	**67.0**	
	Taif TC	**33**	**36.3**	**58**	**63.7**	
	Tabouk TC	**27**	**50.0**	**27**	**50.0**	
	Jazan TC	**59**	**51.8**	**55**	**48.2**	
Department of study	**Theoretical departments**	**96**	**52.5**	**87**	**47.5**	**P=0.000**
	Practical departments	**50**	**41.3**	**71**	**58.7**	
	Scientific departments	**46**	**27.7**	**120**	**72.3**	
Qualification	**Science**	**90**	**34.5**	**171**	**65.5**	**P=0.003**
	Art	**96**	**50.0**	**96**	**50.0**	
	Teacher Training Ins.	**6**	**33.3**	**12**	**66.7**	
Level of study	**Freshman**	**38**	**31.1**	**84**	**68.9**	**P=0.013**
	Sophomore	**49**	**48.5**	**52**	**51.5**	
	Junior	**47**	**50.0**	**47**	**50.0**	
	Senior	**46**	**38.3**	**74**	**61.7**	
Age group	**17-20**	**51**	**36.7**	**88**	**63.3**	**P=0.192**
	21-24	**127**	**44.4**	**159**	**55.6**	
	25+	**15**	**34.1**	**29**	**65.9**	

The results, as seen in Table 7.10(B), indicated that there were significant differences between those students who had no access to computers and those who did, in relation to their college location, department of study, qualification and level of study, but there was no significant association with students' age. These indications led to the rejection of the null hypothesis that there is no significant association between respondents' access to computers and the variables mentioned above, except for age. The significant differences between students in regard to their departments of study, qualifications and level of study were consistent with the previous findings. However, the significant differences in regard to the college location might be attributable to the fact that Riyadh and Dammam TCs were located where big computer markets were available, and Taif TC is located close to Jeddah, where there is another big computer market.

Further investigations were carried out in regard to the students' ownership of a PC to examine the associations between those students who had access to computers at college, at home, sharing access to computers with friends and their computer experience to test the following null hypotheses:

> ***There is no significant association between respondents' having access to computers at college and those indicated no experience with computers.***
>
> ***There is no significant association between respondents' having access to computers at home and those indicated no experience with computers.***
>
> ***There is no significant association between respondents' sharing access to computers with friends and those indicated no experience with computers.***

Table 7.10 (C): The association between respondents' having access to computers at college, at home and sharing with friends and their computer experience

Access to computers		Had no experience with computers				Chi square value
		Yes		No		
		Freq.	%	Freq.	%	
Available at college	Yes	7	11.1	56	88.9	P=0.001
	No	132	32.4	275	67.6	
Available at home	Yes	6	4.8	118	95.2	P=0.000
	No	133	38.4	213	61.6	
Sharing with friends	Yes	30	26.5	83	73.5	P=0.42
	No	109	30.5	248	69.5	

The results in Table 7.10 (C) show that only one out of ten of those respondents having access to computer at college and one out of twenty having access to computer at home indicate no experience with computers, whereas more than one fifth of those sharing access to computers with their friends indicate no computer experience. These results indicate the importance of ownership of computers for computer experience. Thus the first two null hypotheses were rejected and the third one was accepted.

7.5.1.5. Place of computer training:

Regarding the place where the computer training occurred, the findings are summarised in Table 7.11.

Table7.11: Students' sample distribution by place of computer training

Places of computer training	Yes		No	
	Freq.	%	Freq.	%
High school	265	56.1	209	43.9
College	77	16.3	395	83.7
Private institute	49	10.4	423	89.6
Themselves	55	11.7	417	88.3

The results in Table 7.11 revealed that more than half of the sample had been trained to use computers at high school, 16% in college, about one out of ten had trained themselves in their spare time and a similar proportion had gone to private institutes. Given the age of the sample, and the length of time computer studies has been a compulsory part of the secondary curriculum, it would be expected that most, if not all, students would have reported receiving computer training at high school.

7.5.1.6. Purpose of computer use and the average duration of use weekly:

When students were asked about their purpose in using computers, if they used them, the results revealed that only 20 students (4%) used computers for work, while about one fifth used them for leisure and one third used them for both work and leisure; 42% expressed no use at all (Table 7.12 A).

Table 7.12 (A): The students' distribution by the purpose of using computers

Use computer for	Freq.	%
Work	20	4.3
Leisure	87	18.5
Both	164	34.9
No use	199	42.3

The percentage of respondents who expressed no use was close to the percentage of those who expressed lack of access to computers. These indications confirm the consistency of respondents.

To avoid the small number in some cells, since those who used computers for work are a small proportion (only 20), and for the calculation to be more accurate those who used computers for work, leisure or for both were grouped together in one group and non users contained in the other group. The results were as seen in Table 7.12B.

Table 7.12 (B): The students' use of computers

Students' use of computer	Freq.	%
Use computers for work, leisure or both	271	57.7
Did not use computers	199	42.3

The association between the respondents' personal characteristics and the purpose for computer use was investigated to test the following null hypothesis:

There is no significant association between respondents' use of computers for work or leisure or for both and their personal characteristics.

Table 7.12(C): The associations between students' use of computers for work or leisure or for both and their personal characteristics

Students' personal characteristics		The use of computers				Chi square value
		Use computers		Do not use computer		
		Freq.	%	Freq.	%	
College Location	Riyadh TC	71	61.2	45	38.8	P=0.11
	Dammam TC	61	62.9	36	37.1	
	Taif TC	51	56.0	40	44.0	
	Tabouk TC	22	41.5	31	58.5	
	Jazan TC	66	58.4	47	41.6	
Department of study	Theoretical departments	92	50.8	89	49.2	P=0.044
	Practical departments	72	59.5	49	40.5	
	Scientific departments	106	63.9	60	36.1	
Qualification	Science	162	62.1	99	37.9	P=0.048
	Art	97	51.1	93	48.9	
	Teacher Training Ins.	12	66.7	6	33.3	
Level of study	Freshman	93	76.2	29	23.8	P=0.000
	Sophomore	55	54.5	46	45.5	
	Junior	45	47.9	49	52.1	
	Senior	52	44.1	66	55.9	
Age	17-20	104	74.8	35	25.2	P=0.000
	21-24	145	50.7	141	49.3	
	25+	21	47.7	23	52.3	

The results of the calculation, as seen in Table 7.12 (C), show that significant associations were found among all these characteristics except the college location, where respondents indicated similar percentages of computer use for work/leisure and non-use of computers. Thus, the null hypothesis was accepted for the characteristic of college location and rejected for all other characteristics.

In relation to the purpose of computer use, students were asked about the length of time they spent in working on the computer in an average week.

Table 7.13(A): The duration of computer use weekly

Duration of computer use	Freq.	%
0 Hours	266	56.5
1-3 Hours	152	32.3
4+ hours	53	11.3

The results indicated very low computer use. More than half of the respondents did not use the computer regularly for as much as an hour, one third used it between 1-3 hours and only one out of ten used it for more than 4 hours in an average week (Table 7.13A). The number of students who expressed 0 hours computer use was larger than that of students who indicated computer non- use in the previous item. The differences between the two groups might come from the fact that some of the students might have used computers, but not regularly, or only for a very short time (<1hour).

The students' duration of computer use was cross-tabulated with their personal characteristics to investigate the association between the two variables and chi square tests were used to test the null hypothesis that:

> ***There is no significant association between the students' duration of computer use and their personal characteristics.***

Table 7.13(B): The associations between students' duration of computer use and their personal characteristics

Students' personal characteristics		Duration of computer use						Chi square value
		0- Hour		1-3 Hours		4+ Hours		
		Freq.	%	Freq.	%	Freq.	%	
College Location	Riyadh TC	58	21.8	39	25.7	18	34.00	P=0.057
	Dammam TC	52	19.5	29	19.1	16	30.2	
	Taif TC	50	18.8	29	19.1	12	22.6	
	Tabouk TC	36	13.5	16	10.5	2	3.8	
	Jazan TC	70	26.3	39	25.7	5	9.4	
Department of study	Theoretical departments	120	65.6	49	26.8	14	7.7	P=0.001
	Practical departments	68	56.2	43	35.5	10	8.3	
	Scientific departments	76	46.1	60	36.4	29	17.6	
Qualification	Science	129	49.6	99	38.1	32	12.3	P=0.015
	Art	126	65.6	48	25.0	18	9.4	
	Teacher Training Ins.	10	55.6	5	27.8	3	16.7	
Level of study	Freshman	45	36.9	51	41.8	26	21.3	P=0.003
	Sophomore	64	63.4	29	28.7	8	7.9	
	Junior	61	64.9	26	27.7	7	7.4	
	Senior	80	67.2	29	24.4	10	8.4	
Age	17-20	60	43.2	55	39.6	24	17.3	P=0.003
	21-24	176	61.3	86	30.0	25	8.7	
	25+	29	65.9	11	25.0	4	9.1	

As seen in Table 7.13(B), significant associations were found between respondents' duration of computer use and their departments of study, levels of study, qualifications and age. No significant association was found with college location. Therefore, the null hypothesis was rejected in regard to the previous four variables, and accepted only in regard to college location.

The relationship between the availability of computers at college, at home, sharing access to computers with friends and the hours spent using computers weekly were investigated to test the following null hypotheses:

There is no significant association between students' having access to computers at college and the duration of computer use in an average week.

There is no significant association between students' having access to computers at home and the duration of computer use in an average week.

There is no significant association between students' sharing access to computers with friends and the duration of computer use in an average week.

Table 7.13 (C): The association between students' having access to computers at college, at home and sharing with friend and the hours spent using computers weekly

Availability of computer		Duration of computer use						Chi square value
		0- Hour		1-3 Hours		4+ Hours		
		Freq.	%	Freq.	%	Freq.	%	
At college	Yes	24	38.7	24	38.7	14	22.6	P=0.001
	No	242	59.5	127	31.2	38	9.3	
At home	Yes	23	18.5	59	47.6	42	33.9	P=0.000
	No	243	70.4	92	26.7	10	2.9	
Sharing with friends	Yes	56	49.6	50	44.2	7	6.2	P=0.004
	No	210	59.0	101	28.4	45	12.6	

Table 7.13 (C) shows that significant associations were found between

availability of access to computers to students at college, at home, sharing with friends and the length of hours spent working in computers, since the probability for three cases were <0.05. Therefore, students who had access to computers at college, at home and those who shared computers with friends expressed longer time working on computers than their colleagues. Therefore, all the null hypotheses were rejected.

7.5.1.7. Students' familiarity with Computer applications:

Students' familiarity with various computer applications was examined also as part of the investigation of students' computer experience. Most of the computer applications known were listed and students were asked to tick those applications known to them.

Table 7.14: Students' familiarity with computer applications

Computer applications	Yes		No	
	Freq.	%	Freq.	%
Can not use any of these applications	201	42.6	271	57.4
Graphics	167	35.4	305	64.6
Record Keeping	109	23.1	363	76.9
Word Processing	94	19.9	378	80.1
Spreadsheet	67	14.2	405	85.8
Instructional Programming	62	13.1	410	86.9
Programming	54	11.4	418	88.6
Data Base	49	10.4	423	89.6
Accounting	30	6.4	442	93.6
Desk-top Publishing	25	5.3	447	94.7

As seen in Table 7.14, about half of the students were not familiar with any of the computer applications listed, about one- third expressed familiarity with Graphics, about a quarter with Record Keeping and about one fifth with Word processing. The other applications, namely Spreadsheet, Instructional Programming, Programming, Data Base, Accounting, and Desk-top Publishing were less known among students, since only about one in ten or less expressed familiarity with each of these applications.

7.5.1.8. Interest in taking computer courses and type of format preferred:

When students were asked about their interest in taking a computer course, the results indicated high interest in doing so, since more than four students out of five were interested in taking a computer course, as seen in Table 7.15.

Table 7.15: Students' interest in taking computer course

Students' computer interest	Freq.	%
Had taken computer course and feel no need for more	22	4.7
Interested in taking a computer course	405	86.2
Not interested in taking any computer course	43	9.1

Only 22 students (5%) mentioned that they had taken a computer course and felt no need for any more and 43 students (9%) indicated no interest in taking any computer course.

Table 7.16: Students' desire for computer course format

Computer course format	Freq.	%
Short course (6-10 weeks)	88	18.7
Optional one term course	185	39.4
Compulsory one term course	171	36.4
No need for computer course	26	5.5

The results in Table 7.16 revealed that, whereas only less than 6% of all respondents indicated the option of "No need" for computer course, about one fifth preferred a short course computer training, about one-third preferred a compulsory one term computer course and the largest group, 39%, preferred an optional one term course. These results indicated that even though the computer course will be an extra load on the college curriculum, most students (three- quarters) would prefer to take a compulsory or optional one- term computer course. This indicates a strong desire and need among students for a computer training course. A similar inference may be drawn from the finding, in response to a previous item, that about one fifth of students had gone to private institutions seeking computer training or trained themselves in their spare time (see Table 7.11). All these responses point to the importance of computer training for all students.

7.5.1.9. Sources of learning about computers:

Respondents were then asked about their sources of learning about computers. Several sources were listed, and students were asked to select from them.

Table 7.17(A): Sources of learning about computers

Sources of learning about computers	Yes		No	
	Freq.	%	Freq.	%
Course work	297	62.9	175	37.1
Friends	155	32.9	316	67.1
Newspapers and computer magazines	81	17.2	390	82.8
Video and television	47	10.0	424	90.0
Books	42	8.9	429	91.1
Colleagues	31	6.6	440	93.4
College computer centre	27	5.7	444	94.3

The most frequently reported source of learning about computers was course work, indicated by about two thirds of respondents. This results was not surprised, since computer courses were part of the secondary school curriculum. Friends were the next common source of learning about computers, as about one third of all students mentioned that source. The other sources listed above each contributed to the computer learning for some students, though in varying degrees (Table 7.17A). The number of responses exceeded the actual number of respondents, since some students indicated having learned about computers from more than one source.

It is noticeable that the number of students who mentioned that they had learned about computers from course work (Table 7.17A) was 297, is very close to the number of students (294) who revealed that they had been computer trained through a full course in the third item in this section (see Table 7.9A). These consistencies between the responses to the two items confirmed the validity of the data obtained.

The most frequently cited sources of students' learning about computers, course work and friends, were cross- tabulated among their personal characteristics and the chi square tests were applied to examine the following null hypotheses:

There is no significant association between students' learning about computers from course work and their personal characteristics.

There is no significant association between students' learning about computers from friends and their personal characteristics.

Table 7.17(B): The associations between students' learning about computers from course work and their personal characteristics

Students' personal characteristics		Learning about computer from course work				Chi square value
		Yes		No		
		Freq.	%	Freq.	%	
College location	Riyadh TC	74	63.8	42	36.2	P=0.003
	Dammam TC	58	59.8	39	40.2	
	Taif TC	48	52.7	43	47.3	
	Tabouk TC	29	53.7	25	46.3	
	Jazan TC	88	77.2	26	22.8	
Department of study	Theoretical departments	106	57.9	77	42.1	P=0.000
	Practical departments	62	51.2	59	48.8	
	Scientific departments	129	77.7	37	22.3	
Qualification	Science	183	70.1	78	29.9	P=0.002
	Art	104	54.2	88	45.8	
	Teacher Training Ins.	10	55.6	8	44.4	

Continued: Table 7.17(B): The associations between students' learning about computers from course work and their personal characteristics

Students' personal characteristics		Learning about computer from course work				Chi square value
		Yes		No		
		Freq.	%	Freq.	%	
Level of study	**Freshman**	62	75.4	30	24.6	P=0.001
	Sophomore	63	62.4	38	37.6	
	Junior	60	63.8	34	36.2	
	Senior	60	50.0	60	50.0	
Age	**17-20**	109	78.4	30	21.6	P=0.000
	21-24	169	58.7	119	41.3	
	25+	19	43.2	25	56.8	

The results of the chi square tests revealed significant associations between students' learning about computers from course work and their college location, department of study, qualification, level of study and age group, with a probability of <0.05. Thus, the null hypothesis was rejected in regard to all these characteristics (Table 7.17B).

Table 7.17(C): The associations between students' learning about computers from friends and their personal characteristics

Students' personal characteristics		Learning about computer from friends				Chi square value
		Yes		No		
		Freq.	%	Freq.	%	
College location	**Riyadh TC**	42	36.5	73	63.5	P=0.000
	Dammam TC	51	52.6	46	47.4	
	Taif TC	22	24.2	69	75.8	
	Tabouk TC	16	29.6	38	70.4	
	Jazan TC	24	21.1	90	78.9	
Age group	**17-20**	35	25.2	104	74.8	P=0.005
	21-24	98	34.0	190	66.0	
	25+	22	51.2	21	48.8	

Learning about computers from friends was also associated significantly only with students' college location and age group variables (Table 7.17C). Therefore, the null hypothesis was rejected in regard to these two factors, and accepted in relation to the other factors, e.g. department of study, level of study and qualification, where no significant associations were found. Students from Dammam TC relied more on friends in learning about computers. The main difference for the age group was found between the younger students (17-20) and the older, 25 years or older. Whereas only a quarter of younger students relied on friends for learning about computers, one half of older students did so.

7.5.2. Knowledge about computers:

The same items of computer knowledge introduced to TS (see Chapter 6) were introduced to the TC students with the same options, one correct statement, three false statements and the fifth option "Do not know" to test their computer knowledge. The same procedure used for scoring the TS responses was used for scoring students' responses, one for the correct answer and zero for the wrong answer or "do not know".

Table 7.18(A): The students' responses for the computer knowledge items

Knowledge statements	Right		Wrong		Don't know	
	Freq.	%	Freq.	%	Freq.	%
Computers are not good for tasks that require intuition	155	32.9	136	28.9	180	38.2
The main duty of a computer programmer is to prepare instructions for a computer	186	39.5	136	28.9	149	31.6
Computer software is a term that describes a computer program	241	51.2	84	17.8	146	31.0
The physical parts of computer are referred to as hardware	239	51.1	96	20.5	133	28.4
A computer program is a set of instructions to control the computer	219	46.6	119	25.3	132	28.1
An operating computer follows a set of instruction written by people	250	53.3	132	28.1	87	18.6
A computer needs, to solve a problem, the name of the program and user number	244	51.8	119	25.3	108	22.9

Even though the content of the test was very simple and related to basic computer literacy, the percentage of correct responses was very low, ranging, as seen in Table 7.18(A), from about 53% for item six to 33% for the first item. The first and the second questions were the ones students seemed to find most difficult, since about 29% students answered each of them wrongly and about one –third avoided answering each of them by choosing the "Don't know" option.

The number of correct answers for all the items were calculated for all respondents and organised in order placing those students who answered all items wrongly first, those who answered one item correctly second and so on until the eighth group, in which students answered all the seven items correctly.

Table 7.18(B): The distribution of the correct items for all students

The total of the correct answers	Freq.	%
No correct	58	12.3
1 Item correct	49	10.4
2 Items correct	64	13.6
3 Items correct	78	16.5
4 Items correct	80	16.9
5 Items correct	76	16.1
6 Items correct	46	9.7
7 Items correct	21	4.4

Note: The mean = 3.25; SD = 2.00

The results of the calculation, as seen in Table 7.18(B), revealed that 80 students (17%) answered 4 items correctly, this being the category with the highest number of students, while only about 21 students (4.4%) answered all items correctly and 58 students (12%) answered all items wrongly.

These results indicated that the students' computer literacy was low and students revealed a serious lack of basic computer knowledge.

To facilitate the analysis of the computer knowledge test, the eight groups of responses were collapsed to three groups. Those respondents who answered all items wrongly, or answered only one or two items correctly were collected in the first group, those who answered three or four items correctly were gathered in the second group and those who answered five, six or all items correctly made the third group.

Table 7.18(C): The distribution of students in regard to their correct answers grouping

The number of items answered correctly	Freq.	%
0-2 correct items	171	36.2
3-4 Correct items	158	33.5
5-7 correct items	143	30.3

The results, as seen in Table 7.18C indicated that 171 students (36.2%) answered all items wrongly or answered one or two items correctly, 158 students (33.5%) answered three or four items correctly and 143 students (30.3%) answered five, six or all the seven items correctly.

These totals were cross tabulated with different variables such as the personal characteristics of respondents, the computer experience, the duration of computer use and computer ownership, to test the associations between the students' computer knowledge and these variables. Chi- square tests were applied to test the following null hypotheses:

There are no significant differences between students who answered two items or less correctly, those who answered three or four items correctly and those who answered five or more items correctly in relation to their personal characteristics.

There are no significant differences between students who answered two items or less correctly, those who answered three or four items correctly

and those who answered five or more items correctly in relation to their computer experience.

There are no significant differences between students who answered two items or less correctly, those who answered three or four items correctly and those who answered five or more correctly in relation to their use of computers.

There are no significant differences between students who answered two items or less correctly, those who answered three or four items correctly and those who answered four or more correctly in relationship to the ownership of computers.

Table 7.18(D): The associations between students' number of correct items in the computer knowledge section and their personal characteristics

Students' personal characteristics		Number of correct items in the computer knowledge section						Chi square value
		0-2 correct		3-4 correct		5-7 correct		
		Freq.	%	Freq.	%	Freq.	%	
College location	Riyadh TC	33	28.4	36	31.0	47	40.6	P=0.009
	Dammam TC	45	46.4	35	36.1	17	17.5	
	Taif TC	30	33.0	28	30.8	33	36.2	
	Tabouk TC	26	48.1	16	29.6	12	22.2	
	Jazan TC	37	32.5	43	37.7	34	29.8	
Department of study	Theoretical departments	74	40.4	70	38.3	39	21.3	P=0.000
	Practical departments	57	47.1	36	29.8	28	23.1	
	Scientific departments	39	23.5	52	31.3	75	45.2	
Qualification	Science	79	30.3	84	32.2	98	37.5	P=0.000
	Art	88	45.8	65	33.9	39	20.3	
	Teacher Training Ins.	4	22.2	9	50.0	5	27.8	
Level of study	Freshman	28	23.0	44	36.0	50	41.0	P=0.000
	Sophomore	35	34.7	32	31.7	34	33.7	
	Junior	42	44.7	32	34.0	20	21.3	
	Senior	57	47.5	33	27.5	30	25.0	
Age group	17-20	36	25.9	48	34.5	55	39.6	P=0.010
	21-24	118	41.0	92	31.9	78	27.1	
	25+	17	38.6	18	40.9	9	20.5	

The results as seen in Table 7.18(D) revealed significant associations between the number of items students answered correctly and all their personal characteristics, e.g. college locations, departments of study, levels of study, qualification and age group. Therefore, the null hypothesis was rejected in each case. The differences between respondents in regard to their levels of study were mainly between freshman and junior and between freshman and senior students, with a high probability of 0.000 in each case. The percentage of freshman students who answered two or fewer items correctly was smaller than in the other two groups and the percentages of students who answered 2-4 items correctly and those who answered 5-7 items correctly were higher.

Table 7.18(E): The associations between students' number of correct items in the computer knowledge section and their computer experience, computer use and availability of access to computer at college and at home

Students' computer experience, use and ownership		Number of correct items answered in the computer knowledge section						Chi square value
		0-2 correct		3-4 correct		5-7 correct		
		Freq.	%	Freq.	%	Freq.	%	
Had experience with computer	Yes	90	27.0	124	37.2	119	35.8	P=0.000
	No	81	58.2	34	24.5	24	17.3	
Use computer for work or leisure	Yes	69	25.5	99	36.5	103	38	P=0.000
	No	100	50.3	59	29.6	40	20.1	
Access to computer available at college	Yes	17	27.0	20	31.7	26	41.3	P=0.10
	No	153	37.6	137	33.7	117	28.7	
Access to computer available at home	Yes	26	21.0	45	36.3	53	42.7	P=0.000
	No	144	41.6	112	32.4	90	26	

The outcome of the cross tabulation of the number of correct answers by students in the knowledge test with the variables, e.g. computer experience, computer use and availability of access to computers at college and at home, shows significant associations (Table 7.18.E). Those students who had computer experience, used computers and had their own computers at home answered more items correctly than those that did not. The chi square values were highly significant, since the probability exceeded 0.05 except for those who have access to computers at college. These results revealed that students who had no computer experience, did not use computers and did not own a computer at home lacked even very basic computer knowledge. These results are further indications of the validity of the study. Introducing computer training for students can erase this problem of computer illiteracy.

7.5.3. Computer training needs:

Sixteen different topics in computers were introduced to students to estimate their needs for each of these topics, as they perceived them, using a four-point scale; 4 for Great Need, 3 for Some Need, 2 for No Need and 1 for No Answer, because of lack of information.

Table 7.19(A): The students' rating of the computer training topics in order according to the Great Need option

Computer training topics	No Answer 1		No need 2		Some Need 3		Great Need 4	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
8) Knowing how to use computer to help with class housekeeping	25	5.3	30	6.4	91	19.4	323	68.9
2) Knowing how to get Information in and out of a computer	23	4.9	24	5.1	122	26.0	300	64.0
16) Knowing how to benefit from Internet	40	8.5	36	7.7	103	21.9	291	61.9
15) Knowing how to use computer for presentation	32	6.8	30	6.4	138	29.4	270	57.4
1) Knowing about programming	34	7.3	18	3.8	152	32.5	264	56.4
7) Knowing how to use computer as a means of teaching problem solving	25	5.3	48	10.2	162	34.4	236	50.1
3) Knowing how to select educational software	37	7.9	40	8.5	176	37.4	218	46.3
5) Learning about the role of computer in society	23	4.9	81	17.2	154	32.8	212	45.1
6) Knowing how to use a computer as a high interest drill and practice vehicle	28	5.9	43	9.1	192	40.8	208	44.2
13) Knowing how to use Word Processing	69	14.7	38	8.1	160	34.1	202	43.1
9) Knowing how to use computer to evaluate students	27	5.8	67	14.3	177	37.7	198	42.2
12) Knowing how to use spreadsheet	65	13.9	56	12.0	163	34.8	184	39.3
14) Knowing how to use Database management	58	12.4	51	10.9	190	40.5	170	36.2
10) Knowing how to apply the computer to diagnose students' abilities	35	7.5	104	22.2	188	40.2	141	30.1
11) Knowing how to use Multimedia	88	18.8	75	16.0	169	36.0	137	29.2
4) Learning about the history & the development of computer	36	7.7	197	41.9	154	32.8	83	17.7

As with TS, the ratings of computer training topics were listed in sequence according to the "Great Need" option, and the results are presented in Table 7.19 (A).

As seen in the table, "Knowing how to use computer to help with class housekeeping" was rated as number one with "Great Need" from about 323 students (69%) and only 25 students (5%) rated this topic as one for which they had "No Need". The second topic rated with "Great Need" was "Knowing how to get information in and out of computer", since 300 students (64%) said that. The topic least seen by students as a "Great Need" was "Learning about computer history and development" (83 students), which was also most frequently rated "No Need" (197 students 42%). This topic was rated lowest by TS also. Multimedia, Word processing, Spreadsheet and Database management received large numbers of "No Answer" responses, 88, 69, and 58 respectively, perhaps suggesting that students did not know enough about these topics to comment.

The associations between the students' rating of these topics and their demographic characteristics, computer experience, computer use, computer ownership and interest in computer classes were tested using chi square tests to investigate the following null hypotheses:

> ***There is no significant association between students' rating of the computer topics and their personal characteristics.***
>
> ***There is no significant association between students' rating of the computer topics and their computer experience.***
>
> ***There is no significant association between students rating of the computer topics and their computer use.***
>
> ***There is no significant difference in rating of the computer topics between those students who owned PCs at home or at college and those who did not.***
>
> ***There is no significant difference in rating of the computer topics between those students who expressed interest in computer classes and those who did not.***

Table 7.19(B): The associations between students' ratings of computer training topics and their personal characteristics

Computer Topics	Variables	Chi square values
How to get information in and out of a computer	**Level of study**	**P=0.014**
Learning about computer history and development	**College location** **Level of study**	**P=0.006** **P=0.038**
Learning about the role of computer in society	**College location** **Qualification**	**P=0.002** **P=0.033**
Knowing how to use computer for as a high-interest drill and practice vehicle	**Age**	**P=0.037**
Knowing how to select educational software	**Age**	**P=0.001**
Knowing how to use Data Base management	**College location** **Department of study** **Qualification**	**P=0.036** **P=0.030** **P=0.038**
Knowing how to use Spreadsheet	**Department of study**	**P=0.031**
Knowing how to use computer for presentation	**College location**	**P=0.043**
Knowing how to use Multimedia	**Qualification**	**P=0.030**

The first option in the scale "No Answer", was excluded for all sixteen topics and counted as a missing value, since some of the significant associations, especially between the students' rating and the computer experience, use and ownership of PC variables, were related only to this option.

Regarding the association between training topics and students' personal characteristics, as seen in Table 7.19 (B), the most frequently significant factor was college location, with less need for the topics concerned being expressed by students of Dammam and Riyadh TCs than those of other colleges. Where age or study level were significant, less need was expressed by younger or freshmen than other students. As regards Qualification, students with Teacher Training Institute qualifications expressed more interest in Database management and less in the role of computers in society and Multimedia than other students; it was predominantly Science- trained students who expressed strong interest in Multimedia.

No significant association was found between the students' computer experience, use and ownership of PCs and their rating of the computer training need topics, especially when the option "No Answer" was excluded. Thus, the null hypotheses related to these variables were accepted; students rated these topics similarly, regardless of their computer experience, use and ownership of PCs.

The association between those students who expressed interest for computer classes and their rating of the computer topics was investigated to test the following hypothesis:

There is no significant association between the students' desire for computer classes and their rating for the computer topics.

Table 7.19(C): The associations between students' ratings of computer training topics and their interest in taking computer classes

Computer Topics	Variables	Chi square values
Knowing programming	**Students interested in taking computer classes**	**P0.000**
How to get information in and out of a computer	**Students interested in taking computer classes**	**P=0.015**
Learning about the computer history	**Students interested in taking computer classes**	**P=0.006**
Knowing how to use a computer as a high interest drill and practice vehicle	**Students interested in taking computer classes**	**P=0.011**
Knowing how to use computers as a means of teaching problem solving	**Students interested in taking computer classes**	**P=0.021**
Knowing How to use Word Processing	**Students interested in taking computer classes**	**P=0.002**
Knowing how to use Data Base management	**Students interested in taking computer classes**	**P=0.000**
Knowing how to use computer for presentation	**Students interested in taking computer classes**	**P=0.000**

The results, as seen in Table 7.19C, revealed significant associations for 9 of the 16 items. Those who were interested in taking computer classes more inclined than others to express "Great Need" for the computer topics. The topics which showed no significant correlation with interest in computer classes included three items (Multimedia, Spreadsheet and Database management) which had a high percentage of non-answers in Table 7.19 (A) suggesting that students knew too little about these topics to comment on them; and Class Housekeeping, which the great majority (90%) of students rated as a needed topic.

7.6. Summary:

The findings reported in this chapter revealed that college students, like teacher staff (TS), reported only low levels of computer experience and displayed a lack of even the most basic computer knowledge. That this should be the case among students, who went through secondary school at a time when computer studies had been made a compulsory part of the curriculum, is surprising and cause for concern. Many students, in fact, discounted their secondary school experience altogether; some commented on its excessively theoretical orientation and the lack of opportunity for "hands-on" computer experience. Computer experience, access and use tended to be higher among those with a scientific background in secondary school than among those who had studied Arts, and among those in science departments in college, and than those in the TD and PD. College location was a significant factor in relation to some aspects of experience and knowledge. Most significantly, Riyadh and Dammam TCs, the only two in the sample which have Computer Studies departments, tended to do better in this respect.

Students expressed a need and willingness to undergo computer training, and saw their greatest needs as being related to the use of computers for classroom housekeeping; inputting and accessing information; and being able to benefit from the internet.

The findings from the students' questionnaires reveal a high level of consistency with those from the TS, as regards the generally low level of computer experience, use and knowledge. They are also similar to the findings from the TS, in regard to the relative advantage enjoyed by those in SD. Other significant factors, such as age and level of study, may imply an increase in the effectiveness of computer training in schools, since the differential appears to be in favour of younger, freshman students, i.e. those who have most recently left school.

The next chapter will present the data from the Attitude scales, for both college teachers and college students.

CHAPTER EIGHT

DATA ANALYSIS OF ATTITUDE SCALES

CHAPTER 8

Data Analysis of the Attitude Scales

8.1. Introduction:

Analysis of the responses to the Attitude section supplied by 147 teaching staff (TS) and 472 students who returned completed questionnaires, are presented in this chapter. The responses were subjected to data analysis including identification of groups, analysis of attitude scales and relationships between variables.

8.2. Validity and reliability of the attitude scales:

The validity and the reliability of the four Attitude scales, WANT, NEED, ENJOYMENT and ANXIETY were tested. Factor analysis was used to confirm the concept structure of the instrument, while the Cronbach Alpha Coefficient was used to test the reliability of each scale.

8.2.1. Factor analysis validity:

Even though factor analysis for the Attitude section (see Appendix A, p. A5) of the instrument was carried out in the previous study (Fodah 1990), as mentioned in Chapter 5, the researcher included all items in factor analysis. This procedure was applied to identify any potential underlying dimensions that were associated with patterns of responses by the raters, to see if there were close similarities between the factors found by the developers and factors identified by this study. Factor analysis was conducted, also, to test the consistency of this study, in the teaching staff aspect, with the previous study, to facilitate the comparison between the results of the two studies, and also to contribute in assessing both the validity and the reliability of the attitude scale in the current study. If great consistencies were found between the two studies in the attitude scales, these would indicate that the scale is reliable and concurrently valid to be used to measure the computer attitude of respondents similar in the level of education and with a similar culture (Youngman, 1979).

Table 8.1: Initial statistics for teaching staff's questionnaire 17 items including, Factors, Eigenvalue, Percentage of total variance and total variance (N=144)

Factor	Eigenvalue	Pct of Var.	Cum Pct
NEED	4.23	24.9	24.9
ENJOYMENT	2.22	13.1	37.9
ANXIETY	1.74	10.3	48.2
WANT	1.19	7.0	55.2

In the present study, principal components factor analysis with varimax rotation was applied and produced four uncorrelated factors. The four factors were named logically according to the most representative statements for the factor (i.e. those with the highest loading). Three items of the questionnaire were loaded in the first factor, NEED, three items were loaded in the second factor, ENJOYMENT, 5 items were loaded in the third factor, ANXIETY, and in the fourth factor, WANT, six items were loaded.

Table 8.2: The rotated matrix for the teaching staff questionnaire factors and the value of each item loaded sorted by size

Item number	NEED	ENJOYMENT	ANXIETY	WANT
ATT16	.894	.013	.090	.007
ATT15	.804	.253	.010	.227
ATT17	.796	.142	.047	.108
ATT09	.131	.739	.196	.321
ATT03	.118	.704	-.034	.079
ATT12	.126	.683	.098	.122
ATT10	-.099	.069	.754	-.068
ATT02	-.056	.356	.694	-.0009
ATT11	.078	.131	.672	.008
ATT07	.079	-.026	.660	.038
ATT14	.192	-.283	.544	.068
ATT06	.214	.073	.029	.833
ATT01	.225	-.103	-.029	.729
ATT05	.112	.410	.022	.523
ATT08	.363	.460	.081	.498
ATT04	-.157	.295	.016	.438
ATT13	-.023	.142	-.009	.381

Table 8.2 shows the rotated matrix for these factors and the value of each item loaded sorted by size.

Table 8.3: Comparison between previous study and the current study factor analysis results after item omissions

The attitude items	The previous study by Fodah				The current study			
	NED	CON	ANX	WNT	NED	ENJ	ANX	WNT
1) Like to learn about Computers				✓				✓
2) Nervous about using computers			✓				✓	
3) Enjoy playing video games						✓		
5) like to own computer				✓				✓
6) Like to attend computer training				✓				✓
7) Feel uneasy with electrical gadgets			✓				✓	
8) Like to use computer at school/work				✓				✓
9) Enjoy working with computer		✓				✓		
10) Working in a room filled with computers would make me feel uneasy							✓	
11) Feel Uneasy when people talk about computers			✓				✓	
12) Confident about being able to use a computer		✓				✓		

NED: NEED; CON: CONFIDENCE; ANX: ANXIETY; WNT: WANT &ENJ: ENJOYMENT

Continued: Table 8.3: Comparison between previous study and the current study factor analysis results after item omissions

The attitude items	The previous study by Fodah				The current study			
	NED	CON	ANX	WNT	NED	ENJ	ANX	WNT
15) All Teacher College staff should be aware of computer and its Applications	✓				✓			
16) All Teacher College Students should be aware of computer and its applications	✓				✓			
17) Computers should be use in learning different subjects beside mathematics and science	✓				✓			

NED: NEED; CON: CONFIDENCE; ANX: ANXIETY; WNT: WANT &ENJ: ENJOYMENT

These results were similar, though not identical, to results found by the original instrument by Fodah (1990), as seen in Table 8.3, where all items were loaded in the same factors. Moreover, several items, 3, 10, 13, and 14 were not loaded in any factors in the previous study, but in this study they were loaded in various factors. Items 10 and 14 were loaded to the ANXIETY scale, Item 13 to the ENJOYMENT scale and Item 3 to the WANT scale. This loading might have occurred because the researcher in the current study changed the scale values to a five- point scale instead of four as in the previous study. The "Cannot answer" option in the current study was given the value of 3 (the middle) for respondents who did not answer the questionnaire, because of lack of information, to be added in the analysis, since they were part of the study sample. Since the loaded value of item 10 was 0.75 in the rotated matrix (Table 8.2) and the item total correlation for reliability in the ANXIETY scale for this item was high enough (0.53), the item was added to the other items, 2, 7, 11. The situation for Item 3 was similar; the loaded value in the rotated matrix was .70 and the item correlation for this item in the reliability test was significant, since it was above .35 and the item was loaded to the ENJOYMENT scale. Item 14 was omitted from the ANXIETY scale and items 4 and 13 omitted from the WANT scale, since the item total correlations for reliability for the three items were only 0.30, 0.29 and 0.24 respectively (see Table 8.4C and 8.4D), which are not significant values according to Gall et al. (1996) and also, to improve the scales' reliability.

Variations between the two studies, the current study and the previous study (Fodah, 1990) were expected, since the populations of the two studies came from different regions of the country and differed in the place of work and because of the time gap in collecting data. This point will be discussed further, later (Chapter 10). However, since the variations between these two results in the factor analysis were very small and the consistencies were large, these results provided a strong indication of the validity of the current study and also supported the reliability of the instrument.

8.2.2. Reliability coefficients of the attitude scales (Teaching Staff):

The reliabilities of the four Attitude scales were tested, using Cronbach's Alpha. The reliability coefficients for each of the four scales NEED, ENJOYMENT, ANXIETY and WANT were 0.83, 0.69, 0.69 and 0.66 respectively. The complementary- alpha values given in Tables 8.4 (A), 8.4 (B) 8.4 (C) and 8.4(D) indicate that all of the four scales have a satisfactory make-up of items.

Table 8.4(A): Reliability analysis of teaching staff Need scale

No	The items	Item total Correlation	Alpha if Item Deleted
15	**All Teacher College staff should be aware of computer and its Applications**	.67	.78
16	**All Teacher College Students should be aware of computer and its applications**	.74	.70
17	**Computers should be use in learning different subjects beside mathematics and science**	.65	.79
N of Cases =147.0	**N of Items =3**	**Alpha =.83**	

Table 8.4(B): Reliability analysis of teaching staff Enjoyment scale

No	The items	Item total correlation	Alpha if item deleted
3	**Enjoy playing video games**	.47	.64
9	**Enjoy working with computer**	.57	.54
12	**Confident about being able to use a computer**	.49	.62
N of Cases =146.0	**N of Items =3**	**Alpha =.69**	

Table 8.4(C): Reliability analysis of teaching staff Anxiety scale

No	The items	Item total Correlation	Alpha if Item Deleted
2	**Nervous about using computers**	.55	.59
7	**Feel uneasy with electrical gadgets**	.43	.68
10	**Working in a room filled with computers would make me feel uneasy**	.53	.60
11	**Feel Uneasy when people talk about computers**	.44	.66
14	**The uses of computer in schools are fad**	.33	.70
N of Cases =145	**N of Items =5**	**Alpha =.69**	

Table 8.4(D): Reliability analysis of teaching staff Want scale

No	The items	Item total correlation	Alpha if item deleted
1	**I Like to learn about Computers**	48	.71
4	**Comfortable using account card**	.29	.66
5	**I like to own computer**	.49	.71
6	**I Like to attend computer training**	.67	.60
8	**I Like to use computer at school/work**	.52	.69
13	**Computers are gaining much control over people**	.24	.70
N of Cases =146 0	**N of Items =6**		**Alpha =.66**

8.2.3. Reliability analysis for the attitude scales (Students):

The reliabilities for the four scales, ANXIETY, ENJOYMENT, NEED and WANT, which measure the students' Attitude toward computers, were analysed. The Cronbach Alpha for reliability was calculated for each scale and the outcome for the WANT scale is presented in Table 8.5(A).

Table 8.5(A): The Reliability analysis of the attitude scale WANT

Scales	The attitude items	Item total correlation	Alpha if item deleted
WANT	**1) Like to learn about Computers**	**0.59**	**0.60**
	4) Comfortable using account card	**0.25***	**0.69**
	5) like to own computer	**0.56**	**0.60**
	6) Like to attend computer training	**0.47**	**0.62**
	8) Like to use computer at school/work	**0.52**	**0.60**
	13) Computers are gaining much control over people	**0.18***	**0.72**
N of Cases =463	**N of Items =6**	**Alpha = 0.68**	

Table 8.5 (A) shows that the Alpha reliability for the WANT scale is 0.68 for the six items included in this scale. However, taking into consideration the criterion threshold of 0.35, item 4 and item 13 were omitted, since the total inter-correlations for these items were only 0.25 and 0.18 respectively. When these two items were omitted the Alpha reliability was increased from 0.68 to 0.77. These two items, 4 and 13, also showed low correlations when the same scale was used with TS (Table 8.4D), and were deleted. The WANT scale with the four items, 1, 5, 6, and 8 appeared to be more homogenous and sufficiently reliable to measure the students' attitude toward computers.

Table 8.5(B): The Reliability analysis of the attitude scale ENJOYMENT

Scales	The attitude items	Item total correlation	Alpha if item deleted
ENJOYMENT	**3) Enjoy playing video games**	**0.36**	**0.49**
	9) Enjoy working with computer	**0.48**	**0.31**
	12) Confident about being able to use a computer	**0.32***	**0.60**
N of Cases =466	**N of Items =3**	**Alpha =0.57**	

The Alpha reliability result for the ENJOYMENT scale, which consisted of only three items 3, 9 and 12, was 0.57, as seen in Table 8.5 (B). However, this result could be increased to 0.60, if item 12 were deleted, since its correlation is only 0.32, which is lower than the significance threshold of 0.35. Since item 12 is the only item which reflects the students' confidence about computer use, and the scale included only three items, however, item 12 was retained, despite its low correlation, especially as an Alpha reliability of 0.57 is considered significant.

Table 8.5(C): The Reliability analysis of the attitude scale ANXIETY

Scales	The attitude items	Item total correlation	Alpha if item deleted
ANXIETY	**2) Nervous about using computers**	**0.47**	**0.61**
	7) Feel uneasy with electrical gadgets	**0.42**	**0.63**
	10) Working in a room filled with computers would make me feel uneasy	**0.50**	**0.60**
	11) Feel Uneasy when people talk about computers	**0.44**	**0.62**
	14) The uses of computer in schools are fad	**0.33***	**0.67**
N of Cases =466	**No of items = 5**	**Alpha = 0.68**	

The ANXIETY scale, which covered almost all the negative items, had 0.68 Alpha reliability (Table 8.5 C). These results are similar to the Alpha reliability results obtained when the reliability for the same items was tested with TS in section 8.2.1. Item 14 in each case had a correlation lower than 0.35 and was, therefore, deleted from the scale in both cases, for TS and students, particularly as this made very little difference to the Alpha reliability.

Table 8.5(D): The Reliability analysis of the attitude scale NEED

Scales	The attitude items		Item total correlation	Alpha if item deleted
NEED	**15) All Teacher College staff should be aware of computer and its Applications**		**0.55**	**0.70**
	16) All Teacher College Students should be aware of computer and its applications		**0.63**	**0.60**
	17) Computers should be use in learning different subjects beside mathematics and science		**0.56**	**0.69**
N of Cases = 471		**N of Items = 3**	**Alpha =0.75**	

The Alpha coefficient for the three items, included in the NEED scale was highly significant, since the Alpha was 0 .75 and the inter-correlation ranged between 0.70 for item 15 and 0.60 for item 16 (Table 8.5 D). These results indicate that this scale was sufficient and reliable to measure the students' need of computer awareness.

8.3. Analysis of teaching staff responses:

In the Attitude section, seventeen items were listed and respondents were asked to express their feeling about computers and their utilisation using a 5- point Likert-scale: 1- for "Strongly agree;" 2 for "Agree;" 3 for Cannot Answer due to unfamiliarity with the information listed; 4 for "Disagree" and 5 for "Strongly Disagree". A total Attitude score was computed for every participant. A high score was meant to indicate a positive attitude toward computers and a low score meant to indicate a negative attitude. Some items, such as 2, 7, 10, 11, 13, and 14 were stated in a negative mode; therefore, scoring in these items was reversed, so the total score would reflect the appropriate low/high continuum.

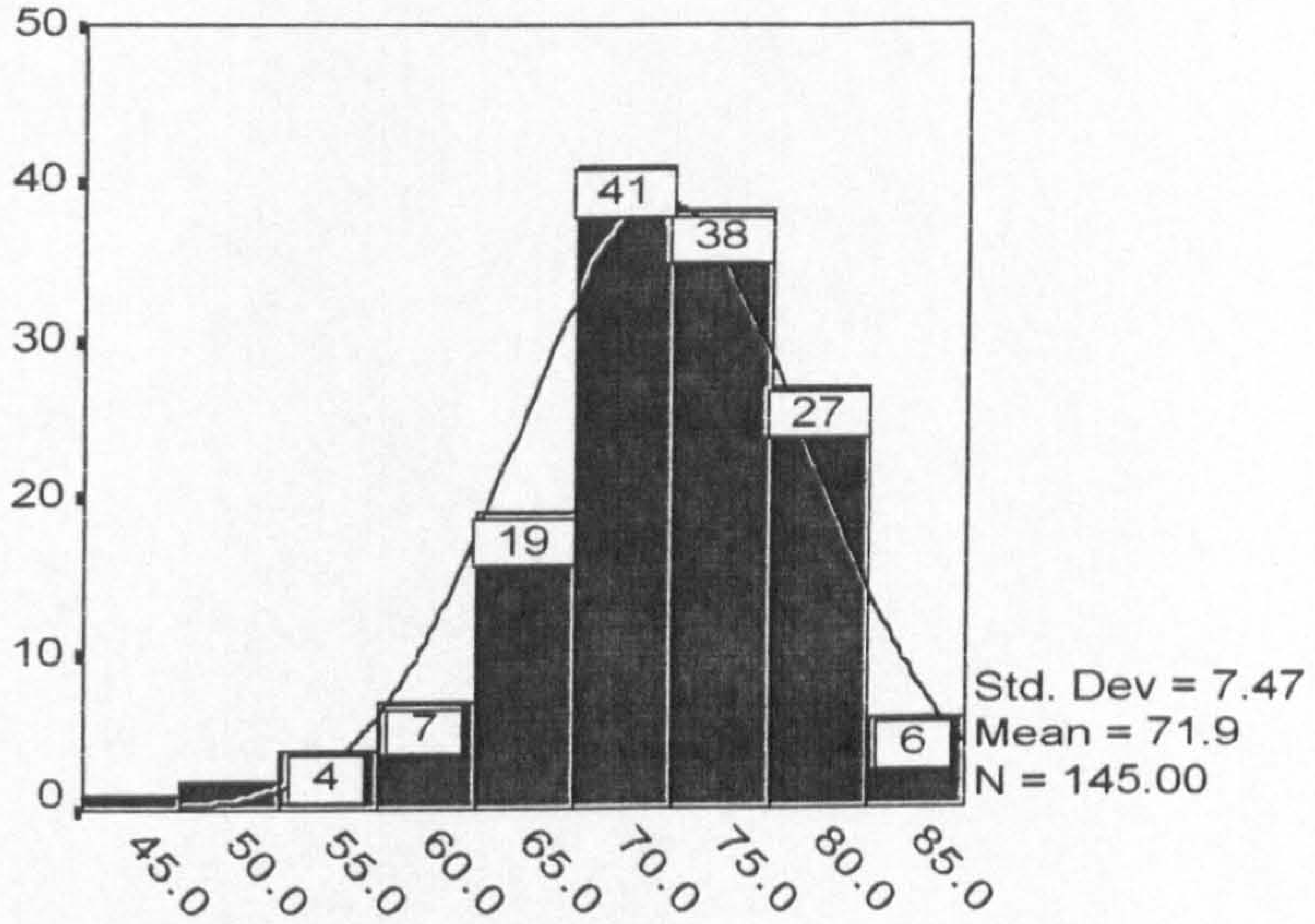
This section presents, first, descriptive data on the teachers' questionnaire responses, then, the outcomes of tests for possible relationships between teachers' personal characteristics, computer experience and computer knowledge, and their scores on the Attitude scales.

8.3.1. Descriptive data:

The total responses, the mean and the standard deviation of the attitude scale were calculated for TS are presented in Figure 8.1 and Table 8.6 to highlight the general attitude of this group.

The scores of the TS entire sample (145 respondents and 2 missing cases) are calculated and displayed in Figure 8.1.

Figure 8.1: The distribution of teaching staff attitude toward computers, the mean and the standard deviation



As seen in the figure, the mean score for the TS was 71.9, and the standard deviation was 7.47. Scores ranged from 45, obtained by only 2 respondents, to 85, obtained by 6 respondents. Most respondents were distributed around the mean score; 125 respondents obtained between scores 65 and 80. These results indicate that the respondents' distribution was normal and typical.

Table 8.6: The teaching staff's distribution for the attitude scale

Scales	The attitude items	S D A	D A	C A	A	S A	M	SD
		Freq.	Freq.	Freq.	Freq.	Freq.		
WANT	**1) Like to learn about Computers**	**2**	**2**	**1**	**27**	**115**	**4.71**	**.69**
	5) like to own computer	**2**	**2**	**4**	**28**	**111**	**4.66**	**.73**
	6) Like to attend computer training	**5**	**5**	**3**	**53**	**81**	**4.36**	**.99**
	8) Like to use computer at school/work	**2**	**4**	**2**	**34**	**104**	**4.60**	**.77**
ENJOYMENT	**3) Enjoy playing video games**	**8**	**17**	**21**	**60**	**41**	**3.74**	**1.15**
	9) Enjoy working with computer	**2**	**7**	**17**	**40**	**80**	**4.29**	**.95**
	12) Confident about being able to use a computer	**8**	**18**	**10**	**54**	**57**	**3.91**	**1.19**
ANXIETY	**2) Nervous about using computers**	**5**	**13**	**17**	**52**	**60**	**4.01**	**1.09**
	7) Feel uneasy with electrical gadgets	**13**	**19**	**15**	**46**	**54**	**3.74**	**1.31**
	10) Working in a room filled with computers would make me feel uneasy	**7**	**14**	**17**	**56**	**53**	**3.91**	**1.13**
	11) Feel Uneasy when people talk about computers	**6**	**12**	**9**	**63**	**55**	**4.02**	**1.07**
NEED	**15) All Teacher College staff should be aware of computer and its Applications**	**0**	**3**	**1**	**42**	**101**	**4.63**	**.60**
	16) All Teacher College Students should be aware of computer and its applications	**0**	**3**	**1**	**50**	**93**	**4.59**	**.62**
	17) Computers should be use in learning different subjects beside mathematics and science	**0**	**1**	**1**	**50**	**95**	**4.63**	**.54**

** SDA (Strongly Disagree); DA (Disagree); CA (Cannot Answer); A (Agree); SA (Strongly Agree); M (Mean); SD (Standard deviation)*

As seen in the table, whereas a small proportion of respondents responded with disagreement for almost all items in the attitude scale, a large number expressed strong agreement. However, respondents varied in their responses to the negative items, 2, 7, 10, 11, 13 and item 14 and less strong agreement was reported in these items. Some items such as: 1, 5, 8, 15, 16 and 17 had a very high agreement from respondents since more than two thirds of respondents expressed strong agreement toward them. In conclusion, the high consistency of respondents' agreement toward these items indicated the same favourable and sympathetic attitudes that TS had toward computers.

8.3.2. The relationship between the teaching staff's personal characteristics and the attitude scales:

The associations between the TS's personal characteristics such as nationality, department of work, age and their mean scores on the attitude scales were tested, by the use of *t* test for those characteristics where only two categories were available, as in nationality, or by the use of One Way Analysis of Variance (ANOVA), where there were more than two categories.

8.3.2.1 The relationship between the teaching staff's nationality and the attitude scales:

The t- test was applied to examine the association between the TS nationality and their mean scores for each of attitude scales to test the following null hypotheses:

There is no significant difference between respondents' mean scores in the ANXIETY scale between Saudi and non-Saudi teaching staff.

There is no significant difference in the ENJOYMENT scale mean between Saudi and non-Saudi teaching staff.

There is no significant difference in the mean score on the NEED scale between Saudi and non-Saudi teaching staff.

There is no significant difference in the mean score on the WANT scale between Saudi and non-Saudi teaching staff.

Table 8.7: Relationship between sample's nationality and the attitude scales ANXIETY, ENJOYMENT, NEED and WANT

Variable		Number	Mean	SD	Df	T.value
Nationality and ANXIETY scale	**Saudi**	**60**	**14.13**	**3.4**	**144**	**-.12 P=0.90**
	Non-Saudi	**86**	**14.20**	**3.9**		
Nationality and ENJOYMENT scale	**Saudi**	**60**	**11.43**	**2.58**	**142**	**-3.36 p=001**
	Non-Saudi	**84**	**12.75**	**2.10**		
Nationality and NEED scale	**Saudi**	**61**	**13.84**	**1.62**	**145**	**.12 p=.90**
	Non-Saudi	**86**	**13.87**	**1.40**		
Nationality and WANT scale	**Saudi**	**61**	**18.55**	**2.15**	**144**	**1.20 p=.23**
	Non-Saudi	**85**	**18.08**	**2.55**		

The results as seen in Table 8.7 revealed that there are no significant differences between Saudi and non- Saudi TS in the mean scores for three of the four scales; ANIXIETY, NEED and WANT and the only significant difference appeared in the ENJOYMENT scale mean scores. This association in the ENJOYMENT scale had a t-value of 3.36, which is significant at 0.001. This indication of significance revealed that the means of Saudi and non-Saudi TS were statistically different. The non- Saudi TS indicated more computer enjoyment than Saudi TS. However, the last result was anticipated, since most of the non- Saudi TS were concentrated in the scientific (SD) and practical departments (PD), where more computer experience and use were expressed and more access to computers was available at college and at home. These results led to the rejection of the null hypothesis in relation to the ENJOYMENT scale and acceptance for the other three scales: ANXIETY, NEED and WANT. These results gave the impression that all respondents, regardless of their nationality had similar levels of computer ANXIETY, and expressed similar computer NEED and desire, since the score means were close to each other. This similarity in the mean scores might come from the fact that about three quarters of the TS expressed computer use of three hours or less weekly or no use at all (see Table

6.13A).

8.3.2.2. The Relationship between the teaching staff's work departments and attitude scores:

The One Way Analysis of Variance was used to investigate the relationship of the ANXIETY, ENJOYMENT, NEED, WANT mean scores among the TS's work departments to test the following hypotheses:

There is no significant difference in the ANXIETY score means among teaching staff's work departments.

There is no significant difference in the ENJOYMENT score means among teaching staff's work departments.

There is no significant difference in the NEED score means among teaching staff's work departments.

There is no significant difference in the WANT score means among teaching staff's work departments.

Table 8.8: The relationship between the scales ANXIETY, ENJOYMENT, NEED & WANT score means and teaching staff's work departments

Variable	Source	Df	Mean	F Ratio	F Prob.
ANXIETY	**Between Groups**	**3**	**8.30**	**.59**	**.62**
	Within Groups	**134**	**13.95**		
ENJOYMENT	**Between Groups**	**3**	**10.72**	**1.84**	**.14**
	Within Groups	**132**	**5.83**		
NEED	**Between Groups**	**3**	**14.78**	**2.38**	**0.073**
	Within Groups	**134**	**6.22**		
W ANT	**Between Groups**	**3**	**5.98**	**.40**	**.75**
	Within Groups	**133**	**14.88**		

The F ratios for all the four scales were not significant, since they were lower than the critical F ratio at the probability of 0.05 (Table 8.8). Thus, all the four null hypotheses above were accepted. Respondents, regardless of their work departments, expressed similar needs, enjoyment, anxiety and necessities, even though they came from different nationalities, had different computer experience, and differed in their computer use and in availability of access to computers.

8.3.2.3. The Relationship between the teaching staff's qualification and the attitude scores:

The associations between TS's qualification and their ANXIETY, ENJOYMENT, NEED, and WANT scale means were investigated by the use of One Way Analysis of Variance to test the following null hypotheses:

There is no significant difference in the ANXIETY score means among teaching staff's qualification.

There is no significant difference in the ENJOYMENT score means among teaching staff's qualification.

There is no significant difference in the NEED score means among teaching staff's qualification.

There is no significant difference in the WANT score means among teaching staff's qualification.

Table 8.9: The relationship between the scales ANXIETY, ENJOYMENT, NEED & WANT score means and teaching staff's qualification

Variable	Source	Df	Mean	F Ratio	F Prob.
ANXIETY	**Between Groups**	**3**	**34.61**	**2.6**	**.055**
	Within Groups	**142**	**13.36**		
ENJOYMENT	**Between Groups**	**3**	**17.26**	**3.13**	**.028**
	Within Groups	**140**	**5.50**		
NEED	**Between Groups**	**3**	**1.24**	**.19**	**.90**
	Within Groups	**142**	**6.57**		
W ANT	**Between Groups**	**3**	**12.38**	**.85**	**.47**
	Within Groups	**141**	**14.49**		

The One Way Analysis of Variance results of testing the above hypotheses according to TS's qualification are presented in Table 8.9. The results revealed significant differences only in the ENJOYMENT scale mean, where the *F* ratio of 3.13 was revealed, which is significant at the probability of 0.028. The *F* ratios for the other three scales, ANXIETY, NEED and WANT were not significant at $P>0.05$. Therefore, the null hypotheses for the ANXIETY, NEED and WANT scale means in regard to TS qualification were accepted; it can be said that there were no significant differences between respondents in their ANXIETY, NEED and WANT scale means, related to their qualifications. But for the ENJOYMENT scale mean, the situation is different and the null hypothesis was rejected.

To clarify the extent of the significant differences in the ENJOYMENT mean score among TS of different qualifications, Scheffe's test was applied (see Table 8.10).

Table 8.10: Scheffe's Test for differences in the ENJOYMENT score mean among teaching staff's qualification

Respondents' qualification	Freq.	Mean	PhD 1	MA/MS 2	Diploma 3	BA/BS 4
PhD	88	12.6		*		
MA/MS	26	11.04				
Diploma	6	12.5				
BA/BS	24	11.9				

** Indicates significant difference*

The results indicate a significant difference, between respondents holding a PhD and those with MAs or MSs qualification only. Those respondents with master degree showed a less positive computer enjoyment than those holding PhD. These variations between the two groups professorial staff and lecturers might come from the fact that most of the TS holding PhD qualifications were concentrated in the SD and PD, where more computer experience, computer use and computer ownership were found. However, the distribution of MA/MS holders and PhD staff among department of work was tested looking for significant difference in the distribution of the two groups among their departments of work.

The results revealed no significant difference in relating to the qualification they hold staff were distributed about equally among the four departments of work: Theoretical, Practical, Scientific and Education departments. Therefore, the results of the Scheffe's Test for the differences in the ENJOYMENT score mean between staff who are holding PhD and their colleagues who are holding MA/MS might possibly be an example of Type I error.

8.3.2.4. The Relationship between the teaching staff's ages and the attitude scales:

The differences among TS of different ages in their ANXIETY, ENJOYMENT, NEED and WANT scale means were investigated to test the null hypotheses that:

There is no significant difference in the ANXIETY score means among teaching staffs' age.

There is no significant difference in the ENJOYMENT score means among teaching staffs' age.

There is no significant difference in the NEED score means among teaching staffs' age.

There is no significant difference in the WANT score means among teaching staffs' age.

Table 8.11: The relationship between the scales ANXIETY, ENJOYMENT, NEED & WANT score means and teaching staff's ages

Variable	Source	Df	Mean	F Ratio	F Prob.
ANXIETY	**Between Groups**	**4**	**44.55**	**3.45**	**0.01**
	Within Groups	**141**	**12.93**		
ENJOYMENT	**Between Groups**	**4**	**9.45**	**1.67**	**0.16**
	Within Groups	**139**	**5.65**		
NEED	**Between Groups**	**4**	**8.19**	**1.28**	**.28**
	Within Groups	**141**	**6.40**		
W ANT	**Between Groups**	**4**	**12.49**	**.86**	**0.49**
	Within Groups	**140**	**14.50**		

When One way Analysis of Variance was applied, the results of the test were not significant except for the ANXIETY mean score, as seen in Table 8.11. The *F* ratio for the ANXIETY means score among respondents' ages was 3.45, which is significant at the probability of 0.01. Thus, the null hypothesis for this variable was rejected. The *F* ratios for mean scores on the other variables did not reach the chosen significance level of 0.05.

Therefore, the null hypotheses for these variables, ENJOYMENT, NEED and WANT were accepted.

Scheffe's test was used to clarify the significant differences in ANXIETY mean score among TS of different age groups.

Table 8.12: Scheffe's Test for differences on the ANXIETY mean score among teaching staff's ages

Grouping age	Freq.	Mean	21-36 1	37-40 2	41-44 3	45-48 4	49-56 5
1) 21-36	39	15.80			*		
2) 37-40	26	13.50					
3) 41-44	27	12.67					
4) 45-48	35	13.94					
5) 49-56	19	14.37					

** Indicates significant difference*

The Scheffe's test results, as seen in Table 8.12, show that the only significant differences in the ANXIETY mean score among TS age groups existed between respondents in the age range of 21-36 and respondents in the age range of 41-44. Whereas the younger TS had a positive ANXIETY mean score, respondents between the age of 41-44 had a lower ANXIETY mean score. These age related variations came regardless of the fact that 85% of respondents of the age 21-36 were Saudi and about 78% of respondents of the age 41-44 were non-Saudi, since, as mentioned above, most non- Saudi respondents were concentrated in the scientific departments, where more computer experience, computer use and computer ownership were expressed. Again, however, this variation might be an example of Type I error.

8.3.2.5. The Relationship between the teaching staff's college locations and the attitude scales:

The differences among TS in the five TCs in relation to their ANXIETY scale mean were investigated to test the null hypotheses that:

There is no significant difference among teaching staff's college locations in regard to the score mean on the ANXIETY scale.

There is no significant difference among teaching staff's college locations in regard to their score mean on the ENJOYMENT scale.

There is no significant difference among teaching staff's college locations in regard to their score mean on the NEED scale.

There is no significant difference among teaching staff's college locations in regard to their score mean on the WANT scale.

Table 8.13: The relationship between the sub-scales "ANXIETY, ENJOYMENT, NEED & WANT" score means and teaching staff's college locations

Variable	Source	Df	Mean	F Ratio	F Prob.
ANXIETY	**Between Groups**	**4**	**11.32**	**1.01**	**.40**
	Within Groups	**140**	**11.17**		
ENJOYMENT	**Between Groups**	**4**	**11.95**	**1.80**	**.13**
	Within Groups	**141**	**6.6**		
NEED	**Between Groups**	**4**	**2.53**	**1.09**	**.36**
	Within Groups	**142**	**2.31**		
W ANT	**Between Groups**	**4**	**15.04**	**1.42**	**.23**
	Within Groups	**141**	**10.60**		

These four null hypotheses were accepted, since no significant differences were discovered between TS in the five different locations in their mean score for ANXIETY ENJOYMENT, NEED and WANT scales when measuring their attitude toward computers.

8.3.3. The relationship between the teaching staff's computer variables and the attitude scales:

In this section the associations between respondents' computer experience and use and their attitude toward computers, expressed in the scales of NEED, WANT, ENJOYMENT AND ANXIETY are described.

The t-test was used to test the associations of each scale with such characteristics as computer experience, ownership of computer, and computer use. Several hypotheses were tested regarding possible relationships between these factors and the respondents' attitude scales scores. It is important to mention at this stage that all testing of hypotheses was conducted at the 0.05 level of significance and the t-distribution test (T-Test) has been interpreted on the two-tailed test.

8.3.3.1. The relationship between the teaching staff's computer variables and the ANXIETY scale:

T-tests were applied to test several hypotheses relating to possible associations between respondents' ANXIETY scale scores and their computer experience variables such as: experience with computer, computer use, and availability of access to computers. These hypotheses were:

There is no significant difference between respondents who had experience with computers and those who did not have any computer experience in their mean scores on the ANXIETY scale.

There is no significant difference between computer users and non-computer

in their mean scores on the ANXIETY scale.

There is no significant difference between respondents who had access to computers at college and those who did not in their mean scores on the ANXIETY scale.

There is no significant difference between respondents who had access to computers at home and those who did not in their mean scores on the ANXIETY scale.

Table 8.14: Relationship between sample computer variables and the attitude scale ANXIETY

Variable		Number	Mean	SD	Df	T.value
Computer experience	Yes	111	14.04	3.9	144	.77 P=0.44
	No	35	14.60	3.2		
Computer use	Yes	103	14.05	3.83	144	-.60 P=0.55
	No	43	14.47	3.45		
Access to computer at college	Yes	51	14.11	3.84	144	-1.44 P=.88
	No	95	14.21	3.66		
Access to computer at home	Yes	64	13.44	3.71	144	-2.15 P=0.033
	No	82	14.76	3.64		

The results in Table 8.14 show that the t-values indicated no significant associations between the ANXIETY scale mean and the TS computer experience, computer use and availability of computer at college, but a significant association was found with the availability of access to computers at home. Thus, the first three null hypotheses above were accepted and the fourth one was rejected. The last significant association might lead to the effectiveness of PC ownership in decreasing the respondent's tension. It is interesting to note, however, that teachers' experience with computers or access to computers in college were not associated with any reduction in anxiety.

8.3.3.2. The Relationship between the teaching staff's computer variables and The ENJOYMENT scale:

The relationships of the ENJOYMENT scale mean to TS's computer experience, computer use and availability of access to computers were investigated to test the following null hypotheses:

There is no significant difference in the ENJOYMENT scale means between teaching staff who had computer experience and those did not.

There is no significant difference between computer users and non-users teaching staff in their ENJOYMENT scale means.

There is no difference in the ENJOYMENT scale mean score between teaching staff with access to computers at college and those with no access.

There is no difference in the ENJOYMENT scale mean score between teaching staff with access to computers at home and those with no access.

Table 8.15: Relationship between sample computer variables and the attitude scale ENJOYMENT

Variable		Number	Mean	SD	Df	T.value
Computer experience	Yes	111	12.19	2.49	142	-.11 P=0.91
	No	33	12.30	2.08		
Computer use	Yes	103	12.26	2.41	142	.48 P=0.63
	No	41	12.05	2.41		
Access to computer at college	Yes	49	12.12	2.44	142	-.28 P=.78
	No	95	12.24	2.38		
Access to computer at home	Yes	63	12.33	2.43	142	.58 P=0.56
	No	81	12.09	2.39		

The results in Table 8.15 show that the t-values of the relationships of the ENJOYMENT scale mean score to the factors, computer experience, computer use and availability of access to computer were not significant. These results gave the impression that all respondents, regardless of their computer experience, computer use and computer ownership, had similar levels of ENJOYMENT, since the score means were close to each other. This similarity in the mean scores might come from the fact that about three quarters of the TS expressed computer use of three hours or less weekly or no use at all (see Table 6.20A).

8.3.3.3. The relationship between the teaching staff's computer variables and the NEED scale:

Similarly, the relationships of the NEED scale means in the Attitude section with computer experience, computer use and availability of access to computers were investigated to test the following null hypotheses:

> ***There is no significant difference between teaching staff who had computer experience and those did not, in their NEED scale mean.***
>
> ***There is no significant difference between computer users and non- users in their NEED scale mean.***
>
> ***There is no difference in the NEED scale mean score between teaching staff with access to computers at college and those with no access.***
>
> ***There is no difference in the NEED scale mean score between teaching staff with access to computers at home and those with no access.***

Table 8.16: Relationship between sample computer variables and the attitude scale NEED

Variable		Number	Mean	SD	Df	T.value
Computer experience	**Yes**	**112**	**12.82**	**2.66**	**145**	**-1.42 p=0.15**
	No	**34**	**13.52**	**2.01**		
Computer use	**Yes**	**104**	**13.76**	**1.57**	**145**	**-1.12 P=0.26**
	No	**43**	**14.07**	**1.40**		
Access to computer at college	**Yes**	**50**	**12.64**	**3.03**	**144**	**-1.19 P=0.23**
	No	**96**	**13.16**	**2.23**		
Access to computer at home	**Yes**	**65**	**12.69**	**2.72**	**144**	**-1.25 p=0.21**
	No	**81**	**13.22**	**2.38**		

The t- test calculation revealed non-significant t-values for all of the mean scores of the NEED scale in relation to all the independent variables, computer experience, computer use and having access to computers at college and at home. Thus, the null hypotheses were accepted (Table 8.16). These results might be attributed to the fact that most TS, regardless of their computer experience, computer use and ownership of computers, revealed great need to be computer trained, since more than 90% of them expressed a high level of interest in taking computer courses and only 15 respondents (10%) expressed no interest in that (see Table 6.16).

8.3.3.4. The relationship between the teaching staff's computer variables and the WANT scale:

The last Attitude scale was the WANT scale where, again, the relationships between the WANT score mean and TS computer experience, computer use and availability of access to computers were analysed to test the null hypotheses that:

There is no significant difference in the WANT scale mean between teaching staff who had computer experience and those who did not.

There is no significant difference in the WANT scale mean between computer users and non- users teaching staff.

There is no difference in the WANT mean score between teaching staff with access to computers at college and those with no access.

There is no difference in the WANT mean score between teaching staff with access to computers at home and those with no access.

Table 8.17: Relationship between sample computer variables and the attitude scale WANT

Computer Variables		Number	Mean	SD	Df	T.value
Computer experience	Yes	111	18.52	1.95	144	1.54 p=0.12
	No	35	17.82	3.23		
Computer use	Yes	103	18.46	1.99	144	.80 P=0.42
	No	43	18.12	3.02		
Access to computer at college	Yes	50	18.30	2.13	144	-.20 P=0.83
	No	96	18.38	2.44		
Access to computer at home	Yes	64	18.28	2.06	144	-.34 p=0.73
	No	82	18.41	2.53		

Similarly, the results of the t-test values for relationship of all these variables with the WANT scale mean score revealed non-significant differences, since the t-values were smaller than the critical values at the probability of 0.05 or close to it, as seen in Table 8.17. These indications consequently led to the acceptance of the above null hypotheses. Respondents, regardless of their computer use and computer ownership, insisted on the necessity and obligation for computer training, especially since about half of them preferred the choice of a compulsory one-term computer course and about one-third preferred the option of a one- term computer course, when they were asked about the computer course format they would prefer (see Table 6.15).

8.3.4. The Relationship between the teaching staff's computer knowledge and the attitude scales:

The relationship between TS who answered five items or more correctly, those who answered less than five items correctly and more than two and those who answered less than two items correctly in the Computer Knowledge section in relation to the four attitude scales was investigated to test the null hypotheses that:

There is no significant difference among teaching staff who answered five items correctly, those who answered less than five and more than two and those who answered less than two items in relation to the score mean in the ANXIETY scale.

There is no significant difference among teaching staff who answered five items correctly, those who answered less than five and more than two and those who answered less than two items in relation to the score mean in the ENJOYMENT scale.

There is no significant difference among teaching staff who answered five items correctly, those who answered less than five and more than two and those who answered less than two items in relation to the score mean in the WANT scale.

There is no significant difference among teaching staff who answered five items correctly, those who answered less than five and more than two and those who answered less than two items in relation to the score mean in the NEED scale.

Table 8.18: The relationship between the ANXIETY, ENJOYMENT, NEED & WANT score means and teaching staff's correct responses to knowledge items

Variable	Source	Df	Mean	F Ratio	F Prob.
ANXIETY	Between Groups	2	2.87	.21	.81
	Within Groups	143	13.96		
ENJOYMENT	Between Groups	2	5.44	.944	.39
	Within Groups	141	5.76		
NEED	Between Groups	2	1.35	.21	.81
	Within Groups	143	6.52		
W ANT	Between Groups	2	18.39	3.49	.033
	Within Groups	143	5.26		

The results as seen in Table 8.18 revealed that TS performed similarly in the attitude scales, without any significant differences between respondents who answered only two items correctly or fewer, those who answered three or four items correctly and those who answered five items or more correctly, except in the WANT scale where a significant difference was found.

Table 8.19: Scheffe's Test for differences on the ANXIETY mean score by teaching staff's correct Knowledge items

Group of Knowledge	Freq.	Mean	1	2	3
1- Correctly answered from 0-2 items	36	17.53			
2- Correctly answered from 3-4 items	34	18.91	*		
3- Correctly answered from 5-7 items	76	18.50			

* *Indicates significant difference*

The Scheffe's test was applied to clarify the significant difference between the TS. The results, as seen in Table 8.19 revealed a difference between those respondents who answered two items or fewer correctly and those who answered 3-4 items correctly, since the mean of the second group was significantly larger than the mean score of the first group. These results implied that TS who answered 3-4 items correctly enjoyed computers more than those who could only answer two items or fewer of the computer knowledge section.

However, this result might be another Type I error, since the Scheffe's test did not clarify any difference between those who answered five items or more correctly and those who answered only 2 items or fewer correctly.

8.4. Analysis of students' responses:

In this section, descriptive and analytical data from the college students' questionnaire responses are presented, following the same pattern as that adopted for teachers' data in section 8.3.

8.4.1. Descriptive data:

Students responded positively to these four scales, though their scores were lower than those of the teaching staff, as expected.

Figure 8.2: The distribution of students' Attitude toward Computers, the mean and the standard deviation.

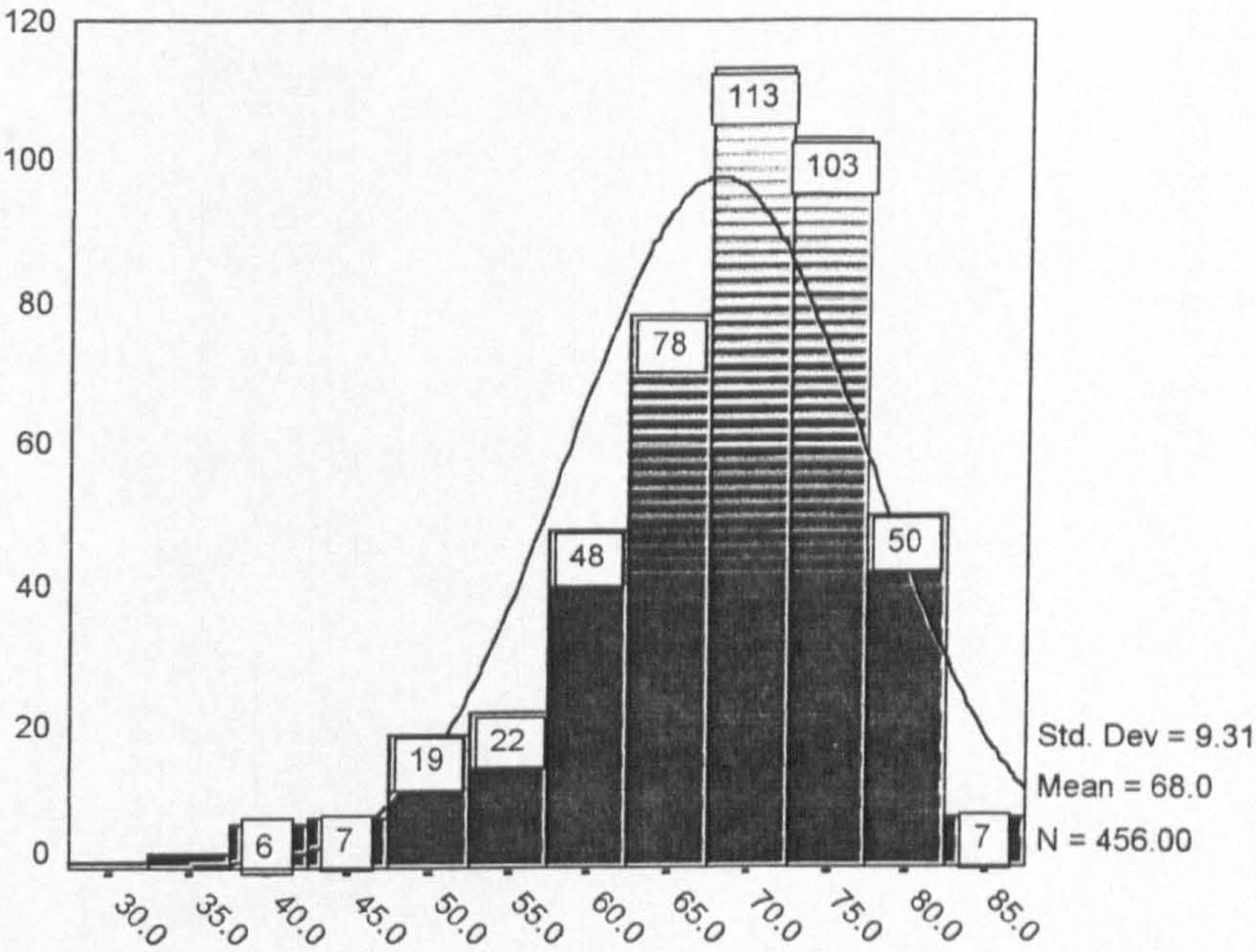


Figure 8.2 shows the distribution of students' attitude scores. As seen in the figure, the scores ranged from 30, scored by only one respondent, to the full score of 85, obtained by 7 students. The mean was 68 and the standard deviation was 9.31.

Frequencies, means and standard deviation in regard to each item in each scale are presented in Table 8.20. Although students' scores were lower than those of the teaching staff, students in general expressed a highly favourable attitude toward computers.

Table 8.20: The students' distribution for the attitude scale

Scales	The attitude items	S D A	D A	C A	A	S A	M	SD
		Freq.	Freq.	Freq.	Freq.	Freq.		
WANT	**1) Like to learn about Computers**	9	9	10	99	345	4.61	.79
	5) like to own computer	12	21	7	88	340	4.54	.93
	6) Like to attend computer training	28	47	31	168	196	3.97	1.19
	8) Like to use computer at school/work	17	36	14	129	274	4.29	1.08
ENJOYMENT	**3) Enjoy playing video games**	11	25	37	170	227	4.23	.97
	9) Enjoy working with computer	16	25	35	142	251	4.25	1.03
	12) Confident about being able to use a computer	40	85	42	172	131	3.57	1.30
ANXIETY	**2) Nervous about using computers**	26	89	46	165	145	3.67	1.25
	7) Feel uneasy with electrical gadgets	65	137	42	151	77	3.08	1.35
	10) Working in a room filled with computers would make me feel uneasy	47	87	48	178	112	3.47	1.30
	11) Feel Uneasy when people talk about computers	44	74	27	182	144	3.65	1.31
NEED	**15) All Teacher College staff should be aware of computer and its Applications**	15	24	18	125	290	4.38	1.00
	16) All Teacher College Students should be aware of computer and its applications	20	38	13	172	229	4.17	1.09
	17) Computers should be use in learning different subjects beside mathematics and science	18	30	23	155	245	4.23	1.06

** SDA (Strongly Disagree); DA (Disagree); CA (Cannot Answer); A (Agree); SA (Strongly Agree); M (Mean); SD (Standard deviation)*

As indicated in the table, mean scores for the items in each scale exceeded the mid-point (2.5), which implies that students in general had a positive attitude toward computers (it should be noted that the items of the ANXIETY scale are all negatively worded items for which, as explained earlier, scoring was reversed, with 1 for Strongly Agree and 5 for Strongly Disagree; therefore, a higher mean indicates lower ANXIETY and more positive attitude).

Item 1 in the WANT scale showed the most favourable response from students. This concerned students' liking to be computer trained. Further discussion about this point will be addressed in the discussion chapter.

8.4.2. Relationship between the students' personal characteristics and attitude scales:

The relationships among the attitude scales, WANT, ANXIETY, ENJOYMENT and NEED and the students' personal characteristics were tested. Since these variables consisted of more than two groups, the One Way Analysis of Variance was used to examine the association between each of these scales and the students' demographic characteristics such as college location, department of study, level of study, qualification and age.

8.4.2.1. The relationship between the students' college location and the attitude scales:

The first variable tested was the students' college location. One Way Analysis of Variance was applied to test the following hypotheses:

There is no significant association between students' WANT mean score and their college location.

There is no significant association between students' ANXIETY mean score and their college location.

There is no significant association between students' ENJOYMENT mean score and their college location.

There is no significant association between students' NEED mean score and their college location.

Table 8.21: The relationship between each of the scales "WANT, ANXIETY,ENJOYMENT& NEED " score means and students' college location

Variable	Source	Df	Mean	F Ratio	F Prob.
W ANT	**Between Groups**	**4**	**5.35**	**0.56**	**0.70**
	Within Groups	**459**	**9.65**		
ANXIETY	**Between Groups**	**4**	**14.40**	**1.058**	**0.38**
	Within Groups	**465**	**13.61**		
ENJOYMENT	**Between Groups**	**4**	**15.66**	**2.68**	**0.031**
	Within Groups	**461**	**5.84**		
NEED	**Between Groups**	**4**	**8.06**	**1.22**	**0.30**
	Within Groups	**466**	**6.61**		

The results, as seen in Table 8.21, indicated no significant associations between the mean score of each of the WANT, ANXIETY and NEED scales and the students' college location. Thus, the null hypotheses in regard to these three scales were accepted. However, significant association was found between the mean score for the ENJOYMENT scale and the students' college location, since the *F* ratio was higher than the critical value with 4 degrees of freedom. Therefore, the null hypothesis was rejected in regard to the ENJOYMENT scale mean score and the students' college location.

Scheffe's test was applied to clarify the significant association between the ENJOYMENT mean score and the students' college location.

Table 8.22: Scheffe's Test for differences on the ENJOYMENT mean score by students' college location

Teacher College	Freq.	Mean	1	2	3	4	5
Riyadh (1)	**115**	**11.98**					
Dammam (2)	95	11.97					
Taif (3)	**91**	**12.14**					
Tabouk (4)	54	11.20					
Jazan (5)	**111**	12.50				*	

* *Indicates significant difference*

The results of the Scheffe's test, as seen in Table 8.22 revealed that there was significant difference in ENJOYMENT mean score between students from Jazan TC and students from Tabouk TC. This difference, however, might be an example of Type I error, because of the unequal sample between the two groups (54 to 111, respectively). Moreover, no significant differences were found among students from different colleges related to their experience with computer, computer use, computer ownership or computer knowledge.

8.4.2.2. The relationship between the students' department of study and the attitude scales:

The associations between the mean score of each of the four attitude scales, WANT, ANXIETY, ENJOYMENT and NEED and the students' departments of study were investigated and One Way analysis of Variance was applied to examine the following null hypotheses:

There is no significant association between the mean score for the WANT scale and students' department of study.

There is no significant association between the mean score for the ANXIETY scale and students' department of study.

There is no significant association between the mean score for the ENJOYMENT scale and students' department of study.

There is no significant association between the mean score for the NEED scale and students' department of study.

Table 8.23: The relationship between each of the scales WANT, ANXIETY, ENJOYMENT& NEED score means and students' department of study

Variable	Source	Df	Mean Square	F Ratio	F Prob.
W ANT	**Between Groups**	**2**	**29.52**	**3.09**	**0.047**
	Within Groups	**459**	**9.56**		
ANXIETY	**Between Groups**	**2**	**41.60**	**3.07**	**0.047**
	Within Groups	**465**	**13.54**		
ENJOYMENT	**Between Groups**	**2**	**42.06**	**7.28**	**0.001**
	Within Groups	**461**	**5.78**		
NEED	**Between Groups**	**2**	**25.40**	**3.87**	**0.022**
	Within Groups	**466**	**6.57**		

The results of the test show highly significant associations between each of the ENJOYMENT and the NEED mean scores and the students' department of study, since the probabilities of the F ratio were 0.001and 0.022 respectively, as seen in Table 8.23. The associations between the mean scores for the other two scales, WANT and ANXIETY, and the students' department of study were significant, but the F ratio values for each of these two scales were not highly significant. Therefore, the differences in mean score between students according to their department of study might not be easy to clarify. However, all the null hypotheses above were rejected.

Scheffe's tests were applied to clarify the differences between the mean score in all these four scales, WANT, ANXIETY, ENJOYMENT and NEED.

Table 8.24: Scheffe's Test for differences on the ENJOYMENT and NEED mean scores among students' department of study

Scales	Department of study	Freq.	Mean	1	2	3
ENJOYMENT	**Theoretical departments**	**180**	**11.67**			
	Practical departments	**121**	**11.85**			
	Scientific departments	**163**	**12.62**	*	*	
NEED	**Theoretical departments**	**182**	**12.40**			
	Practical departments	**121**	**12.83**			
	Scientific departments	**166**	**13.16**	*		

* *Indicates significant difference*

As predicted, the Scheffe's test did not reveal any differences between the mean scores for the WANT and ANXIETY scales in relation to students' department of study, since, as mentioned before, the significance value of the test was close to 0.05. However, in the case of the NEED and ENJOYMENT scales, the differences were clarified, as seen in Table 8.24. Students in the SD obtained higher mean scores in the ENJOYMENT and NEED scales than students in the TD. Moreover, students in the SD obtained a higher mean score in the ENJOYMENT scale than even students in the PD. These results are consistent with those found in relation to the computer experience variables, where students in the SD indicated more computer experience, computer use and PC ownership than did students in TD and PD. A significant association was found also between duration of computer use and students' department of study, as mentioned before (Table 7.13B). Whereas about 20% students in the SD reported a duration of computer use of 4 hours or more weekly, fewer than one student out of ten from each of the PD and TD reported that. Consequently, it seems that students who used computers more had greater enjoyment of them and felt more need to use them than those who did not use them at all.

8.4.2.3. <u>The relationship between the students' level of study and the attitude scales:</u>

The relationships between the mean scores for the four attitude scales and the students' level of study were investigated to test the following null hypotheses:

There is no significant association between the mean score of the WANT scale and the students' level of study.

There is no significant association between the mean score of the ANXIETY scale and the students' level of study.

There is no significant association between the mean score of the ENJOYMENT scale and the students' level of study.

There is no significant association between the mean score of the NEED scale and the students' level of study.

Table 8.25: The relationship between each of the scales WANT, ANXIETY, ENJOYMENT& NEED score means and the students' level of study

Variable	Source	Df	Mean Square	F Ratio	F Prob.
W ANT	**Between Groups**	**3**	**7.98**	**.81**	**0.49**
	Within Groups	**425**	**9.81**		
ANXIETY	**Between Groups**	**3**	**9.81**	**.71**	**0.55**
	Within Groups	**431**	**13.79**		
ENJOYMENT	**Between Groups**	**3**	**16.55**	**2.87**	**0.036**
	Within Groups	**428**	**5.77**		
NEED	**Between Groups**	**3**	**11.52**	**1.72**	**0.16**
	Within Groups	**432**	**6.71**		

No significant relationships were found between the mean scores on each of the ANXIETY, WANT and NEED scales and the students' level of study, but, on the other hand, significant relationships were found between the mean scores on the ENJOYMENT scales and level of study (Table 8.25). The significance level of the relationship between the score means of ENJOYMENT scale was high enough to clarify the difference between students at different levels of study. Thus, the null hypotheses related to the mean score on the ANXIEY, WANT and NEED scales were accepted, while the null hypotheses related to the mean scores on the ENJOYMENT scale were rejected.

Scheffe's tests were applied to clarify the associations between score means on the ENJOYMENT scale and the students' level of study.

Table 8.26: Scheffe's Test for differences on the ENJOYMENT mean score by students' level of study

	Department of study	Freq.	Mean	1	2	3	4
ENJOYMENT	**Freshman 1**	**122**	**12.50**			*	
	Sophomore 2	**99**	**11.87**				
	Junior 3	**93**	**11.56**				
	Senior 4	**118**	**12.09**				

* *Indicates significant difference*

The Scheffe's test results revealed that freshman students had higher mean scores on the ENJOYMENT scale than junior students. These results are consistent, again, with the significant associations found between computer experience, computer use, familiarity with computer languages, familiarity with BASIC language and the duration of computer use and students' level of study, where the significant associations were in favour of the freshman students.

The associations between the students' qualification and their mean scores on the WANT, ANXIETY, ENJOYMENT and NEED scales were tested. Again, the One Way Analysis of Variance was used to test the following null hypotheses:

There is no significant association between the mean score of the WANT scale and the students' qualification.

There is no significant association between the mean score of the ANXIETY scale and the students' qualification.

There is no significant association between the mean score of the ENJOYMENT scale and the students' qualification.

There is no significant association between the mean score of the NEED scale and the students' qualification.

Table 8.27: The relationship between each of the scales WANT, ANXIETY, ENJOYMENT& NEED score means and students' qualification

Variable	Source	Df	Mean Square	F Ratio	F Prob.
W ANT	**Between Groups**	**2**	**56.55**	**6.00**	**0.003**
	Within Groups	**460**	**9.41**		
ANXIETY	**Between Groups**	**2**	**24.76**	**1.83**	**0.16**
	Within Groups	**466**	**13.56**		
ENJOYMENT	**Between Groups**	**2**	**29.51**	**5.07**	**0.007**
	Within Groups	**462**	**5.82**		
NEED	**Between Groups**	**2**	**10.86**	**1.64**	**0.20**
	Within Groups	**467**	**6.61**		

The results of the One Way Analysis of variance tests revealed, again, no significant associations between the score means of the ANXIETY and NEED scales in relation to the students' qualification, though significant associations were found for the score means of the WANT and ENJOYMENT scales (Table 8.27). Thus, the null hypotheses related to the ANXIETY and NEED scales were accepted, while the null hypotheses related to the WANT and ENJOYMENT scales were rejected.

The differences in mean scores on the WANT and the ENJOYMENT scales, in relation to the students' qualification, were tested by the use of Scheffe's test to clarify the locations of the differences in each of the two scales.

Table 8:28 Scheffe's Test for differences on the ENJOYMENT mean score by students' qualification

Scales	Qualification	Freq.	Mean	1	2	3
ENJOYMENT	**Science 1**	**259**	**12.36**		*	
	Arts 2	**189**	**11.62**			
	Teacher Training Institute 3	**17**	**12.00**			
WANT	**Science 1**	**259**	**17.79**		*	
	Arts 2	**186**	**16.81**			
	Teacher Training Institute 3	**18**	**18.11**			

* *Indicates significant difference*

The results of the Scheffe's test, as seen in Table 8.28, revealed that the differences between the mean scores of the two scales, WANT and ENJOYMENT, were located between students with a science background and those with an arts background. Students with a science qualification reported higher interest and satisfaction with computers than students with an arts qualification. These results were consistent with previous results, since students with a science qualification were found to be more computer experienced, used computers more, had more access to computers and reported more computer training than students with an arts qualification. However, the mean difference between students with Teacher Training Institute background and those with an arts background is larger, but the Scheffe's test did not clarify this difference, probably because of the big difference in size between the two samples (186 students to only 18 trainees).

8.4.2.4. The relationship between the students' age and the attitude scale:

The associations between the mean score of the four scales, WANT, ANXIETY, ENJOYMENT and NEED and the students' age were examined to test the following null hypotheses:

There is no association between the mean score of the WANT scale and the students' age.

There is no association between the mean score of the ANXIETY scale and the students' age.

There is no association between the mean score of the ENJOYMENT scale and the students' age.

There is no association between the mean score of the NEED scale and the students' age.

Table 8.29: The relationship between each of the scales WANT, ANXIETY, ENJOYMENT& NEED score means and students' age

Variable	Source	Df	Mean Square	F Ratio	F Prob.
W ANT	**Between Groups**	**2**	**1.65**	**.171**	**0.84**
	Within Groups	**460**	**9.66**		
ANXIETY	**Between Groups**	**2**	**8.38**	**1.27**	**0.28**
	Within Groups	**467**	**6.62**		
ENJOYMENT	**Between Groups**	**2**	**28.99**	**4.97**	**0.007**
	Within Groups	**462**	**5.83**		
NEED	**Between Groups**	**2**	**34.84**	**2.57**	**0.077**
	Within Groups	**466**	**13.54**		

The results revealed no significant associations between the mean scores on the WANT, ANXIETY and NEED scales and students' age, leading to the acceptance of the relevant null hypotheses (Table 8.29). However, in regard to the ENJOYMENT scale a significant association was revealed between the mean score and the students' age, which led to the rejection of the null hypothesis.

Scheffe's test was applied to clarify the differences in the mean score relating to students' ages.

Table 8.30: Scheffe's Test for differences on the ENJOYMENT mean score by students' age

	Age groups		Freq.	Mean	1	2	3
ENJOYMENT	**17-20**	**(1)**	**137**	**12.58**		*	
	21-24	**(2)**	**285**	**11.87**			
	25+	**(3)**	**43**	**11.56**			

* *Indicates significant difference*

The test revealed that younger students (17-20) indicated higher computer enjoyment than middle age students (21-24). These results (see Table 8.30) support the results reported regarding the association between students' ages and computer training, (Table 7.9B).

To summarise, younger and freshman students in the SD, with a science background, expressed more enjoyment and interest in computers than middle-age and junior students with an arts background studying in the PD and TD.

8.4.3. The relationship between the students' computer variables and the attitude scores:

The associations between the Attitude scales mean score and students' computer experience, computer use and availability of access to computers were investigated. T-tests were applied to examine the associations between each of these scales and the computer experience variables, computer experience, computer use and availability of access to computers.

8.4.3.1. The relationship between the students' computer variables and the WANT scale:

The associations between the WANT scale mean score and students' computer experience variables were examined to test the null hypothesis that:

There are no significant associations between students' WANT scale mean score and their computer experience, computer use and availability of access to computers at college or at home.

Table 8.31: Relationship between students' WANT mean score and their computer experience, computer use and PC ownership

Variable		Number	Mean	SD	Df	T.value
Computer experience	**Yes**	327	**17.68**	**2.80**	**462**	**2.87P=0.004**
	No	137	**16.78**	**3.65**		
Computer use	**Yes**	267	**17.87**	**2.68**	**460**	**3.83 P=0.000**
	No	195	**16.76**	**3.51**		
Access to computer available at college	**Yes**	62	**18.64**	**1.88**	**460**	**3.40 P=0.001**
	No	400	**17.22**	**3.21**		
Access to computer available at home	**Yes**	122	**18.02**	**2.51**	**460**	**2.56 P=0.01**
	No	340	**17.19**	**3.27**		

The results in Table 8.30 revealed significant associations between the students' WANT scale score mean and their computer experience, computer use and availability of access to computers at college or at home. The t-test values were 2.87, 3.83, 3.40 and 2.56

respectively, with 462 degrees of freedom for the first variable and 460 for the other variables, which were higher than the critical t-test value with a probability of <0.05. These indications led to the rejection of the null hypothesis. Students who had computer experience, who used computers and who had access to computers at college or at home expressed more desire and liking for computer training and use than those who did not.

8.4.3.2. The relationship between the students' computer variables and the ANXIETY scale:

The associations between the ANXIETY scale mean score and students' computer experience, computer use and ownership of PC were also examined and t-tests were applied to test the null hypothesis that:

There are no significant associations between students' ANXIETY mean scores and their computer experience, computer use and availability of access to computers at college or at home.

Table 8.32: Relationship between students' ANXIETY mean score and their computer experience, computer use and availability of access to computers

Variable		Number	Mean	SD	Df	T.value
Computer experience	Yes	331	14.24	3.68	468	3.33 P=0.001
	No	139	13.01	3.57		
Computer use	Yes	269	14.57	3.54	466	4.71 P=0.000
	No	199	12.98	3.71		
Access to computer available at college	Yes	63	14.82	3.73	466	2.22 P=0.027
	No	405	13.72	3.66		
Access to computer available at home	Yes	124	14.81	3.47	466	3.36 P=0.001
	No	344	13.53	3.71		

Significant associations were found between students' ANXIETY mean scores and the four computer variables, computer experience, computer use, availability of access to computer at college and availability of access to computer at home, as seen in Table 8.32. Students with computer experience, those who used computers for work, leisure or for both and those who had access to computers at college or at home had higher scores, i. e. lower positive anxiety than those without, since the differences in the mean scores for the two groups were significant and the t-values were higher than the critical value in the probability of <0.05. Thus, the null hypothesis was rejected in regard to all variables mentioned.

8.4.3.3. The relationship between the students' computer variables and the NEED scale:

T tests were applied also to investigate the relationship between students' NEED mean scores in regard to the same variables: computer experience, computer use and having access to computers at college or at home to test the null hypothesis that:

There are no significant associations between students' NEED scale mean scores and their computer experience, computer use and availability of access to computers at college or at home.

Table 8.33: Relationship between students' NEED mean score and their computer experience, computer use and availability of computers

Variable		Number	Mean	SD	Df	T.value
Computer experience	Yes	333	12.88	2.43	469	1.31 P=0.19
	No	138	12.54	2.87		
Computer use	Yes	271	12.89	2.43	467	1.17 P=0.24
	No	198	12.61	2.76		
Acces to computers available at college	Yes	63	13.34	2.05	467	1.91 P=0.057
	No	406	12.68	2.64		
Access to computers available at home	Yes	124	13.01	2.29	467	1.22 P=0.22
	No	345	12.69	2.67		

No significant associations were revealed between students' mean scores on the

NEED scale and their computer experience or computer use and availability of access to computers at college and at home. Students, regardless of their computer experience or computer use and availability of access to computers college and at home, expressed similar attitudes in the NEED scale, as seen in Table 8.33. Therefore, these results led to the acceptance of the null hypothesis.

8.4.3.4. The relationship between the students' computer variables and the ENJOYMENT scale:

Finally, the associations between the students' ENJOYMENT mean scores and their computer experience, computer use and access to computers were investigated to test the null hypothesis that:

There are no significant associations between students' ENJOYMENT scale mean scores and their computer experience, computer use and availability of access to computers at college or at home.

Table 8.34: Relationship between students' ENJOYMENT mean score among their computer experience, computer use and availability of computers

Variable		Number	Mean	SD	Df	T.value
Computer experience	**Yes**	**328**	**12.42**	**2.10**	**464**	**5.36 P=0.000**
	No	**138**	**11.14**	**2.89**		
Computer use	**Yes**	**268**	**12.60**	**2.01**	**462**	**5.97 P=0.000**
	No	**196**	**11.28**	**2.74**		
Access to computer available at college	**Yes**	**60**	**12.93**	**1.98**	**462**	**3.08 P=0.002**
	No	**404**	**11.91**	**2.47**		
Access to computer available at home	**Yes**	**123**	**12.70**	**1.89**	**462**	**3.55 P=0.000**
	No	**341**	**11.80**	**2.56**		

Table 8.34 shows that those students who had computer experience, used computers

and had access to computers at college or at home revealed more enjoyment with computers in general than those who did not. Thus, the null hypotheses were rejected in regard to all these variables. These results were predicted, and expected, since those students who had computer experience and applied this experience in their use would enjoy playing with computers and get more benefit from computer use than those did not.

8.4.4. The relationship between students' computer knowledge and attitude scores:

The associations between the mean score of the four scales, WANT, ANXIETY, ENJOYMENT and NEED and the students' number of correct answers for the computer knowledge section were examined to test the following null hypotheses:

There is no association between the mean score of the WANT scale and the students' who answered 2 items or less correctly, those who answered 3-4 items correctly and those who answered five items or more correctly.

There is no association between the mean score of the ANXIETY scale and the students' who answered 2 items or less correctly, those who answered 3-4 items correctly and those who answered five items or more correctly.

There is no association between the mean score of the ENJOYMENT scale and the students' who answered 2 items or less correctly, those who answered 3-4 items correctly and those who answered five items or more correctly.

There is no association between the mean score of the NEED scale and the students' who answered 2 items or less correctly, those who answered 3-4 items correctly and those who answered five items or more correctly.

Table 8.35: The relationship between each of the scales WANT, ANXIETY, ENJOYMENT& NEED score means and students' number of correct items in the Computer Knowledge Section

Variable	Source	Df	Mean Square	F Ratio	F Prob.
W ANT	**Between Groups**	**2**	**54.19**	**5.76**	**.003**
	Within Groups	**461**	**9.42**		
ANXIETY	**Between Groups**	**2**	**95.41**	**7.19**	**.001**
	Within Groups	**467**	**13.26**		
ENJOYMENT	**Between Groups**	**2**	**55.03**	**9.64**	**.000**
	Within Groups	**463**	**5.71**		
NEED	**Between Groups**	**2**	**5.00**	**.755**	**.47**
	Within Groups	**468**	**6.63**		

As seen in Table 8.35, the results revealed that there were significant associations between the mean scores of the scales WANT, ENJOYMENT and ANXIETY and the number of items students answered correctly in the Computer Knowledge Section. No significant differences were found between scores on the NEED scale and the number of items students answered correctly.

Scheffe's Test was applied to clarify the extent of the significant differences in the ENJOYMENT, WANT and ANXIETY score means among the three group of students, those who answered 2 items correctly, those who answered three or four items correctly and those who answered five or more items correctly.

Table 8.36: Scheffe's Test for differences on the WANT, ENJOYMENT and ANXIETY mean scores by students' correct knowledge items

	Knowledge items Groups	Freq.	Mean	1	2	3
WANT	**Answered 0-2 items correct (1)**	167	16.85			
	Answered 3-4 items correct (2)	154	17.45			
	Answered 5+ items correct (3)	143	18.04	*		
ENJOYMENT	**Answered 0-2 items correct (1)**	169	11.43			
	Answered 3-4 items correct (2)	155	12.19			
	Answered 5+ items correct (3)	142	12.61	*		
ANXIETY	**Answered 0-2 items correct (1)**	170	13.14			
	Answered 3-4 items correct (2)	157	13.93			
	Answered 5+ items correct (3)	143	14.71	*		

* *Indicates significant difference*

Table 8.36 shows that the students who answered five items correctly indicated more positive computer enjoyment, expressed more necessity for computers and had less anxiety than those who answered only 2 items or less correctly. Thus, the null hypotheses were rejected in regard to the ENJOYMENT, WANT and ANXIETY scales and accepted only in regard to the NEED scale.

8.5. Summary:

Respondents' attitude to computers was analysed in terms of four scales, NEED, WANT, ENJOYMENT and ANXIETY, which corresponded closely with Fodah's original four scales. Among teaching staff attitude scores, particularly those on the ENJOYMENT scale were significantly associated with respondents' nationality, and with qualification, in favour of respondents with greater computer experience and use, and those from SD. The ANXIETY scale also was significantly associated with teaching staff's age.

Students' Attitudes towards computers were generally favourable, especially in relation to the item in the NEED scale concerning a wish to receive computer training.

Significant differences were found, especially in relation to the WANT and ENJOYMENT scales, in favour of students with more experience of, use of and access to computers, and those with a science background.

The next chapter will present the findings from interviews with the decision- makers in Teacher College Administration, official people in Teacher Colleges, in Educational District and with the computer teachers regarding their opinions of the current and planned computer training provision.

CHAPTER NINE

PRESENTATION OF INTERVIEW RESULTS

CHAPTER 9

Presentation of Interview Results

9.1 Introduction:

During a visit to Saudi Arabia (September 1997-February 1998) the investigator interviewed three groups of people with particular responsibilities for the educational system in Saudi Arabia:

1) The decision-makers who played a big role in planning for the computer division in teacher colleges and created the outline for the new computer course, which is designed to be a required course for all teacher colleges' students from the academic year 1997-1998.

2) The director of one of the education districts and the supervisor of computer studies in the same education district.

3) The computer course teachers in the five Teacher Colleges (TC), which were selected as a sample in the empirical study to represent the 17 Teacher Colleges.

To cover areas of study which could not be covered by the questionnaire data, such as the level of the computer courses which being taught to students in the Science and Mathematics departments, and the availability of hardware, software and human resources in TCs, interviews were conducted. Availability of activities related to computer training for teaching staff (TS) and students other than the regular courses, the source of such activities and whether there is any policy regarding computer experience and computer use, when appointing TS for TCs, were also covered in these interviews. Therefore, the perspectives and the views of the decision- makers (DM) in TCs, in the Educational Districts and in the Computer Teaching Staff were considered very important. These people were encouraged by the researcher to participate and give their opinions about these issues. The opinions and views of each group are here presented separately.

9.2. Interview purposes and topics covered:

Before presenting the findings from the interviews, it would be appropriate to identify the purposes of these interviews and clarify the nature of the issues used with each group of interviewees. In this section, therefore, the interview groups are described in turn and the aims for interviewing each group are defined.

9.2.1. The decision- makers:

Relevant officials in the Ministry of Education in Riyadh and in two Teacher Colleges, Riyadh and Taif, were selected for interview. The personnel interviewed were: the Deputy Minister of the Ministry of Education for Teacher Colleges (DMTC), the Vice- President of the Teacher Colleges' Deans Committee, the Students' Affairs Dean (SAD) and the Science Research Dean (SRD) in the Teacher Colleges Administration in the Ministry of Education. The Dean of Taif Teacher College (TTCD) and the Vice-Dean of Riyadh Teacher College (VDRTC), who was also the Head of the Computer Division Planning Committee, were also interviewed. Each interviewee was interviewed in his office. Each interview lasted from thirty to forty five minutes and was tape- recorded.

The DM for TC were interviewed for various purposes, such as:

1) To shed some light on the current situation of the computer courses, which are organised for students in the Mathematics and Science departments, from the opinions of the DM.

2) To define, from the perspective of the decision-makers, the reasons behind creating the new computer course, which was planned to be introduced as a compulsory course for all Teacher College students from the academic year 1997-1998.

3) To ascertain the interviewees' opinions and beliefs about the teaching staff and Teacher College students' need to be aware and knowledgeable about computers and their use in their teaching, their beliefs about the teaching staff and students' attitudes toward computers and their assumption about the possibility of training them in this respect.

4) To determine the availability of hardware, software and human resources in Teacher Colleges, since data about these issues could not be collected via the questionnaires.

5) To find out about the policy of appointing teaching staff for Teacher Colleges, specifically whether experience with computers is a selection criterion or not.

6) To identify the future plan to promote teachers' awareness of the use of computers in their teaching, to encourage their students to use computers in their teaching too.

9.2.2. The responsible people in the Education Districts:

Since the educational districts in the educational system in Saudi Arabia are the source of entrants to the teacher colleges, and the employers of those who graduated from the teacher colleges, the views and opinions of the responsible people in these districts were thought to be very important. Therefore, the perspectives of the directors of these districts were represented in this study. The researcher's intention was to select a random sample of the directors and the computer supervisors in the educational districts around the country to represent the real opinions of these groups. However, since the study was not supported and because of lack of facilities to meet such a sample, the Director of Taif Education District and the Computer Supervisor in the same district were selected to represent the opinions and the views of the responsible people in education districts. Therefore, for these reasons, the results obtained from these interviews should be viewed with some caution.

The Director of Taif Education District is familiar with teacher college programmes, since he used to work in Makkah Teacher College as Assistant Professor in the Mathematics department for a short time and later was Dean of Makkah Teacher College for about 6 years. He is now a member of Taif Teacher College Committee. The Computer Supervisor in the Educational District is a qualified person who was awarded an MSc in Information Management from the USA in 1988. He had taught computer courses for two years in secondary school before he was appointed to supervise all computer teachers in the secondary schools in the district. The interviews were conducted in their offices in Taif District and they lasted about forty-five minutes each.

The official people in Taif Educational District were interviewed to serve various objectives such as:

1) To shed light on the availability of computers in the primary schools in the current time and at the future, the primary school teachers' need to be computer trained and the availability of such training in the educational district.

2) To investigate the availability of computer courses in the secondary school, the way these courses are managed, and the reason behind the deficiencies of computer experience revealed by the questionnaire responses of teacher college students, especially those with an Arts background, even though computer courses were part of the secondary school curriculum.

3) To investigate the opinions of the official people in the district about the need of TC TS and students to be computer trained and to be capable of using computers in their teaching.

9.2.3. Computer Course teachers in Teacher Colleges:

As mentioned in Chapter 2, computer courses were part of the requirement for Science and Mathematics students, since few years ago. Therefore, the opinions and views of the instructors who teach the computer courses for students in the Science and Mathematics divisions were felt to be of great importance to the study, since these teachers are in a good position to evaluate the current computer training courses and to estimate the need for the future.

The interviews with each of the computer course teachers (CCT) in Riyadh and

Taif TCs were conducted in the teachers' offices in each TC, during the researcher's visit in the time mentioned above. However, the interviews with the CCT in Dammam, Tabouk and Jazan TCs were conducted through the telephone line from Taif TC, where most of the study's contacts were made. The interviews lasted from about twenty to forty minutes and notes were taken, since most interviewees were not comfortable being tape-recorded.

The CCT interview schedule covered several objectives such as:

1) To identify the availability of the hardware, software available in TCs, and the appropriateness of these facilities for students and their future needs, as perceived by computer course teachers.

2) To verify the computer human resources and their level of preparation to be computer course teachers.

3) To collect some data related to the computer courses that interviewees were teaching such as the level of the courses, the students' responses to these courses, whether the courses meet the students' future needs as teachers, and respondents' views about the students' attitude toward computers and their confidence when dealing with computers.

4) To verify the need of students other than those in the Mathematics and Science departments for computer training and the computer course teachers' opinions about the new computer courses curriculum, the availability of computer facilities and the proficiency of the computer teaching staff.

5) To clarify the interviewees' thoughts about the need of their colleagues in the other departments to be computer trained and what sort of training they need.

Even though these issues were scheduled to be covered in the interviews, freedom was given to the interviewees to go further in answering the questions, to raise any other issue, which they considered relevant to the matter being investigated.

To ensure the understandability of the questions and to assess the time needed for the interview, as Gall et al. (1996) recommended a trial interview was conducted with the Deputy Dean of Taif TC for the Decision-makers interviews and with the computer course teacher in Taif TC before the real interviews took place.

9.3. General information about interviewees:

In this section, the data obtained in responses to the first section of each interview, concerning interviewees' personal characteristics, are summarised for each group in turn.

9.3.1. The Official People:

Of the seven official people (in the Ministry of Education, in Teacher Colleges and in Taif Educational District) who were interviewed, the computer studies supervisor had an MSc in Information system, while the other six held a Ph.D. qualification in different areas of study. Four of them specialised in Education, and two in Mathematics. All of the seven staff had obtained their highest qualification in the United States of America.

9.3.2. Computer Teachers group:

The computer teachers group consisted of five people, who were teaching the computer courses for students in the Science and Mathematics departments in the five TCs selected for the empirical study, Riyadh, Dammam, Taif, Tabouk and Jazan TCs. Three of them held a Ph.D. in Mathematics; one had a PhD. in Physics and the other had an MSc in Computer Studies.

The interviewees differed in their teaching experience; whereas teacher no.1 had 5 years of experience, the other four teachers had 2 years or less of experience teaching in colleges. Only one had graduated from a Computer Studies department; the other four had received short computer training or none: one for six months, the other for three months, the fourth for a week and the fifth teacher had not been computer trained at all. In each case, the training was in operating computers only. To preserve anonymity, interviewees were designated by number from one to five.

9.4. The perceptions of interviewees about the computer experience and training needs of students and teaching staff:

The opinions of interviewees about the students and the teaching staff were investigated. Since each group of interviewees held different responsibilities and the target populations they represented differed too, the opinions of each group of people are presented in turn.

9.4.1. The opinions of decision makers in the Ministry of Education and in Teacher Colleges:

Decision- makers' opinions are presented here under two broad categories: issues relating to students (including matters pertaining to course provision); and issues relating to teaching staff.

9.4.1.1. The interviewees' opinions about students:

In this category are grouped decision- makers' views related to efforts to meet students' need for computer training, covering the old computer course, reasons for introducing the new course, the importance of computer training, students' attitude to computers, availability of equipment and human resources, and obstacles to course provision.

9.4.1.1.1. The previous computer course load:

The first question asked to this group was about the load of computer courses in the teacher college curriculum before the addition of the new computer literacy courses.

Typically all interviewees mentioned that previously the only computer courses available were a basic course for students in the science and Mathematics departments and an advanced computer course available for students in the mathematics department only. Both these two courses were run via the mathematics department. The Deputy Minister of the Ministry of Education mentioned that these two courses were organised to enhance the computer learning for science students, which they acquired in the secondary schools.

However, the SAD was not satisfied with these courses, since, as he mentioned, they were taught theoretically and included little practical training.

9.4.1.1.2. Reasons for introducing the new computer courses:

Asked about the reasons behind the process of generalising the computer courses for all students in all college departments, interviewees reported that the invasion of computers in every aspect of our lives was the main reason behind this action. The DMTC said:

> "The teacher who does not know how to operate a computer in the near future is going to be an illiterate person and now the computer is invading education as a teaching aid to assist learning, searching for data and communicating with others".

The SAD described the importance of computers for the near future as the fourth basic element of education, after reading, writing and mathematics. He added also that the nature of the global environment today necessitates that in future, teachers should be aware of the new trends in educational technology, aware of the use of computers in education as a teaching tool and familiar with computer applications. The TTCD believed that one of the main reasons behind adding computer courses to the teacher college curriculum is to fill the gap between societal and family needs for computer awareness and the preparation of future teachers. The VDRTC believed that the main reason for the addition of computer literacy courses is to help teacher college students to cope with the future life, which will rely increasingly on computers and educational technology in general.

9.4.1.1.3. The importance of computer training:

The next question in the interview was related to the importance of computer training for teacher college students and the type of computer applications they need, in the opinions of the interviewees.

All interviewees agreed that teacher college students have a real need for more practical computer training rather than theoretical courses. The DMTC reported that the thinking behind the new computer courses is that the colleges will introduce computer literacy courses for all college students and those who need to learn more can learn from other sources. The SRD and the SAD emphasised the importance of training the students in how to use the computer as a teaching tool and practical education medium rather than teaching about the computer itself. Word Processing, Spreadsheet, Graphics and Instructional Programming were considered the most useful applications, according to the TTCD and the VDRTC, as they will help college students as future teachers, to manage their schoolwork and to use computers effectively in their teaching. Integrating computers to teaching subject matters was considered, also, as an important topic.

9.4.1.1.4. Interviewees' perception of students' attitude:

Students, in the interviewees' views, have a very positive attitude toward learning about computers. This assumption was derived, as the SAD, SRD, and the VDRTC reported, from the number of students who applied for the Computer Studies Division, the first enrolled group in the department. As the SAD stated, students who applied to enrol in the year of 1997-98 to the Computer Studies department exceeded tenfold the places available. The TTCD stated related to this matter that:

"Taif Teacher College, like most of the other teacher colleges, in the last few years, has been faced with strong student demand for computer training, since availability of the new computer applications and the ownership of PC has attracted students to learn about computers".

He added:

" Computer training is available in many private institutions. However, since the cost is high and some students cannot afford that, they applied to the college to provide them with such computer training".

9.4.1.1.5. Availability of human and physical resources:

The next question was related to the availability of human and technical resources for introducing computer courses in TCs.

As the DMTC suggested, there is no problem with technical and human resources, since computer facilities and teachers for computers are available in almost all teacher colleges. However, the opinions of the SAD, TTCD and the VDRTC were different. They believed that although there are computer teachers and a computer laboratory in each teacher college, these provisions are not enough. In regard to human resources, teacher colleges need to be supported with more specialised teachers, since several of the people who were teaching computer courses previously were not specialists in computer studies according to the SAD. TTCD was worried about the computer facilities, which he believed need to be modernised and supported with new equipment to be more adequate for the new trends for the full use of computers as a teaching tool.

Some supporting efforts had been made in the form of arrangements with the universities in the areas where some teacher colleges are located, such as Riyadh, Dammam and Jeddah, to compensate for the lack of computer teachers in these teacher colleges, according to the SAD. He stated that:

"An alternative option to overcome the problem of deficiency in qualified computer teachers was to appoint some newly graduated students from the universities, especially those in the computer divisions, and send them abroad to upgrade their level of preparation in teaching computer courses. At the current time, some qualified computer teachers from nearby countries are being used to meet the current deficiency".

The TTCD believed that the deficiency in human resources in computer teachers applies not only in Saudi Arabia, but also in almost all the Arabian countries and because of that, some teachers from mathematics and science departments with experience in computers were assigned to teach computer courses.

Facilities for computers were available in most teacher colleges, according to the DMTC. He suggested that all TCs were equipped with computers and some of these equipment upgraded, as in Riyadh, Dammam and Jeddah TCs. The VDRTC mentioned that in Riyadh TC, where a division for preparing Computer teachers was established, the computer laboratory was provided and equipped with new equipment. However, the TTCD stated that:

"Even though there are two computer laboratories in Taif Teacher College, these laboratories need to be modernised to cope with the fast growth in the computer equipment and with high capacity to be able to benefit from the new computer packages. One of these laboratories has 25 model 486 DX computers and the other one has 25 XT model computers. This equipment is not enough to apply some of the new applications, which need higher capacity equipment".

Nevertheless, the SAD reported that the department of the Deputy Minister for Teacher Colleges (DDMTC) had started a plan to supply new computers to all TCs and three of these teacher colleges had already been supplied with the new equipment (Riyadh, Dammam and Jeddah TCs).

9.4.1.1.6. Obstacles facing the introduction of computer training courses:

As regard the difficulties that might face the introduction of computer training courses for teacher college students, the DMTC believed that there are no obstructions for the time being; however, obstacles might arise when the practical teaching of the computer courses begins. He mentioned that everything is going according to plan and he believed no obstacles would arise. The SRD and the SAD agreed to some extent with the DMTC's suggestion and they suspected that any obstacles raised could be solved. However, the TTCD and VDRTC believed that the deficiency in trained computer teachers and the low level of equipment might be the main obstacles that arise, especially in the first few years, because of the high demand for the computer courses. Therefore, the TTCD suggested that the DDMTC should devise a plan for immediate computer implementation, providing colleges with high capacity equipment and appointing highly qualified and specialised teachers to carry out the teaching of these courses.

9.4.1.2. Interviewees' perspective about teaching staff:

The second part of the interview was related to the viewpoints of the interviewees about the teacher colleges' teaching staff need for computer training, their attitude towards such training and the efforts of the DDMTC in these matters.

9.4.1.2.1. The teaching staff need for computer training:

A question was addressed to interviewees about the computer experience of teacher college staff, in departments other than the Computer division.

All interviewees agreed that most teaching staff in the other departments had poor experience of computers. The DMTC stated that:

> "There is no policy of requiring demanding teaching staff to be experienced in computers, even though the teaching staff need to have some computer experience to facilitate their task and assist them in their work. However, all teaching staff should be aware of all the new trends in education and they should be encouraged to apply their technical experience to their work as much as possible".

The SRD believed that TCs were responsible for teaching staff's lack of computer knowledge, since the college did not provide enough computer facilities for them. The VDRTC had a different view, since he believed that TS were required to participate in research as well as their teaching; therefore, they do not have enough time to spend on learning about computers. Beside that, he mentioned that some teaching staff are still anxious about technology in general and computer use specifically. However, this anxiety could be reduced to the minimum by providing computer training for them, as the VDRTC thought. The TTCD suggested that all TS should learn how to use computers to save their time and effort by applying computers for administrative purposes and as a teaching aid.

9.4.1.2.2. Interviewees' perceptions of teaching staff's attitude:

Interviewees were asked to give their opinions about the teaching staff's attitude and disposition towards computers and their utilisation.

Interviewees reported that TS in TCs had a positive attitude toward being computer trained, even though no real study shows that, as the SAD reported. He added:

> "The annual and monthly reports received from teacher colleges reveal that teaching staff in teacher colleges are constantly clamouring for access to computer facilities".

The TTCD suggests that TS had a positive attitude and were highly sympathetic towards computers and their utilisation. However, the problem that they are not willing to enrol in a computer training course. The VDRTC noticed, from his observation inside the college that most teaching staff had a positive feeling about computers and some of them are willing to learn about them, but others are still tense and afraid that learning about computers might take a long time for them.

9.4.1.2.3. The role of teacher colleges in training teaching staff about computers:

All interviewees emphasised that all teaching staff in all college departments need to be computer trained, not just to save their time in using technology in their administrative work, but also to apply the new technology to their teaching since, as the DMTC commented, "The use of computers in teaching is not a fad, but it is now essential for teachers in schools at all levels".

Several computer- training programmes were offered to teaching staff through the Social Service Centres, which are available in each college, according to the DMTC who stated:

> "In the future, computer training will be offered to teaching staff as well as students. Furthermore, teaching staff in teacher colleges will be connected to a main station in the Teacher Colleges Administration in the Ministry of Education in Riyadh or a main station will established in each teacher college and access to computer will be available to each staff or at least to each department. This is, I believe, the only way to encourage teaching staff to use computers".

TTCD mentioned that the Social Service Centre in every teacher college, with the co-operation of private sector, organised various types of computer training programmes and these programmes were opened to serve the community of the college. Teaching staff, as he reported, are given priority in enrolling in these programmes, and those who are in charge of departments where there is a real need for applying computers to their teaching, for administration jobs, have the opportunity to be computer trained free of charge. However, TTCD mentioned that the teaching staff attendance for these courses was very poor, since some withdrew from the first week, while others disappeared. Therefore, he suggested that TS should be encouraged to be aware of the use of computers as a teaching tool and vehicle for communications.

9.4.1.3. Suggestions and comments:

Finally, interviewees were asked to offer their suggestions on any other points, which had not been covered by the questions. The following suggestions were offered:

1) The SRD in the DDMTC emphasised the importance of teaching staff and college students availing themselves of every opportunity to upgrade their computer expertise and to train themselves via the class courses or by their own efforts to cope with the new trends in using computers as a teaching aid to facilitate their teaching and make it more attractive for their students.

2) The TTCD pointed out the importance of paying more attention to practical training in the computer courses to erase the computer ignorance of college students. He suggested also, that special computer training programmes should be organised for TS in TCs.

9.4.2. The Educational District officials' views:

The interviewees in Taif Educational District (TED) were asked about the availability of computers in the primary schools, the computer course at the secondary school level and the availability of facilities and the interviewees' thoughts about the college staff needs to be computer- trained. Moreover, interviewees were asked to give their views and opinions about future primary school teachers' needs to be computer-trained and the need of their teachers for such training.

9.4.2.1. Computer availability in the primary schools:

The first question was related to computer availability in the primary schools in the district. Computers were available in the primary schools, according to the Computer Studies Supervisor (CSS), but only to serve limited purposes. The main purpose is to use them for record keeping, managing the school administrative, registration and examination processes. Therefore, one computer set is available in each school, where only one of the school staff co-operates to operate the computer. In the private schools, according to the CSS, computers were available and students have the opportunity to use them for Graphics or games only. However, the Taif Educational District Director (TEDD) mentioned that the Ministry of Education is now studying the possibility of introducing computers to primary schools as a result of the availability of modern computer educational programmes in the computer market and because of the invasion of computers throughout society.

9.4.2.2. Interviewees' perceptions of primary school teachers' attitude toward computers:

The TEDD and the CSS were asked for their impressions about the concern of teachers in the primary schools about computers and their attitude toward learning about them, based on their school visits. They both, TEDD and CSS, felt that computer technology is attracting every person in our society, especially teachers, who have a very positive attitude toward learning about computers.

TEDD mentioned that teachers in the primary schools were anxious to learn about technology in general and specifically about computers. Therefore, some of them went to private institutes, while others were trying to teach themselves.

9.4.2.3. The role of the education district in computer training:

Interviewees were asked about the efforts and the role that Taif Educational District carried out to offered computer training to teachers in the district.

The TEDD were disappointed, because the district could not introduce any efforts to fulfil teachers' computer training need, except for short computer training courses lasting just one week, with the co-operation of the companies which provide schools with computers. However, the TEDD believed that such training is available via Teacher Colleges, since there is a great co-operation between the sectors to provide some in-service training programmes in different fields, such as upgrading teacher preparation level, training head teacher, school counsellor and educational administration etc. He believed that Educational Districts in Saudi Arabia look to Teacher Colleges as the pocket of expertise they rely on for in-service training. Such training might be available in the future, when the facilities for training are provided, as the CSS mentioned.

9.4.2.4. The most important computer applications in which interviewees believed that primary school teachers need to be trained:

The following question was about the most important computer applications which interviewees believed that primary school teachers need to be trained in. The TEDD indicated that teachers should be taught not only how to get information in and out of computers, but also how to use computers as teaching tools to benefit the process of learning. He thought general applications such as Word Processing, Spreadsheet and Instructional Programming are very important for teachers in this level to start their computer training. The CSS expressed a similar idea, when he asserted the importance of training teachers in the use of computers as a teaching tool, since computers in the current time could be valuable for teachers in most areas of study, if not in all.

9.4.2.5. Views about the teacher college students' need to be computer-trained:

Interviewees were asked about their beliefs and thoughts about the need of teacher college students, as future primary school teachers, for computer training.

The TEDD believed that now is the appropriate time for training the future teachers on how to use computers, not just as a productive tool, but to be able to benefit from it as an information and communications tool and to consider how to build educational programmes or at least to benefit from the ready- built educational programmes. He added:

"I am looking forward to the time when the primary school teachers can be capable to use at least the educational programmes which are designed to serve educational aims, if not building new educational programmes to facilitate the process of learning for their students and to save their time and efforts".

The CSS insists in the importance of introducing information and communications technology as part of the TC curriculum, and he added that information technology is the language of this age and future teachers have a great need to learn this language.

9.4.2.6. The computer courses in the secondary schools:

In regard to the secondary schools, interviewees were asked about the computer courses which are run at this stage, the adequacy of such courses, and who is required to take these courses, students in the Science division or students in the Arts division, or both.

Interviewees indicated that the computer courses were part of the secondary school curriculum and students in the Science and Arts divisions were required to study three courses, one course for each year. According to the CSS, each course consisted of two parts, theoretical and practical. Access to computers is available in almost all secondary schools. However, as the TEDD mentioned, some of these equipment needs maintenance and some need to be modernised, because of insufficient capability.

9.4.2.7. Reasons behind secondary school students' lack of computer experience:

Interviewees were also asked to express their views about the reasons behind the lack of computer experience of some students graduated from secondary school, even though the computer courses are part of the curriculum.

The CSS pointed out that more attention is given to enabling students in the Science division to practise on the computer, than to students in the Arts division. In each division, he mentioned that students, in theory, study the computer course for two hours weekly, but in practice, in the Arts division, sometimes it is reduced only to one hour. He added:

> "That happens in some schools, where the number of students in the class is great than average (25-30). Sometimes there are forty students in each Arts class, so the computer teacher finds himself forced to divide the students into two groups and work with each group for only one hour to allow students to practise in the computer laboratory. Students in the Science division do not meet this problem, since Science division students are usually lower than 30 to a class. Thus, they have more opportunity for practical training".

The CSS, also, suspected that the lack of computer experience might appear clearer with students coming from particular sub-urban or rural areas. He also added:

> "Schools in the rural areas might sometimes have equipment maintenance problems or electricity supply problems, so students sometimes study only theoretically".

9.4.2.8. The interviewees' views about the Teacher College teaching staff computer training needs:

Interviewees, especially the TEDD, were asked to suggest their thoughts about the Teacher College teaching staff need for computer training.

The TEDD, who used to be the Dean of a teacher college for about six years, insisted strongly on the need for all TC TS to be trained to use computers in their teaching and to apply computer applications to their teaching.

The CSS expressed a similar feeling when he mentioned that training Teacher College teaching staff in how to apply computers to their teaching, without any doubt, would at least stimulate their students to be computer users. He added that not only do Teacher Colleges teaching staff have a great need to be computer trained, but so do head teachers, supervisors, school administrators and school teaching staff.

9.4.3. Computer course teachers in Teacher Colleges:

The third group asked to express their views and opinions in this study were Computer Teachers in Teacher Colleges (CTTC). As mentioned earlier this group, which consisted of five people, was drawn from the same five TCs, which were selected as a sample to represent all the seventeen TCs around the country. The interview covered the two sides of the study, teacher college students and teaching staff (TS).

9.4.3.1. Computer Teachers opinions about the computer courses available for students in Teacher Colleges:

Since these teachers were close to some of the teacher college students, they were asked in the interview about their beliefs and thoughts about the computer courses which are run for Mathematics and Science students, the appropriateness of such courses for students in other departments, and about the students' attitude and confidence when dealing with computers. CTTCs' opinions about the availability of human resources and facilities for computers, other teacher college students' need to be computer trained and the new computer course were covered in the interviews also.

9.4.3.1.1. Assessment of the computer courses offered in Teacher Colleges for Mathematics and Science students:

The first question addressed to computer teachers was about their assessment of the quality of the computer courses, which used to be offered to students in the science and mathematics departments.

In summary, four of the five computer course teachers believed that these courses were mediocre and need to be redesigned to be more adequate, while teacher no.4 believed that these courses were good and they do not need any change. Teacher no.3 added that these courses need more practical time, since most teaching is delivered theoretically.

9.4.3.1.2. The appropriateness of these courses to the students' future needs:

When interviewees were asked about the appropriateness of the syllabus of the computer courses that they teach, for future primary school teachers' needs, all of them indicated that the syllabus of these courses is appropriate to some extent. Teacher no.3 added that the syllabus needs to be reorganised to cover the new trends in computer technology and the practical computer implications in education.

9.4.3.1.3. <u>Interviewees' perception of students' attitudes towards computers:</u>

When asked to assess the students' attitude toward computers and their confidence, Teacher no. 2, Teacher no.4 and Teacher no.5 believed that college students had a strong desire to learn about computers, while Teacher no.3 and teacher no.1 were worried about the students' desire and believed that students had only moderate desire to learn about computers. Teacher no.3 indicated that students need to be encouraged to learn about computers, as they will not do so of their own volition.

Related to that, interviewees were asked about the students' confidence, when dealing with computers. The results revealed that all interviewees believed that students had moderate confidence except Teacher no.2, who believed that they had high confidence. Teacher no.3 added that students sometimes lose their confidence because they are nervous about damaging the equipment.

9.4.3.1.4. <u>The availability of human and physical resources:</u>

Interviewees were also asked about the adequacy of the computer human resources and the availability of the equipment in teacher colleges.

All computer teachers agreed that the computer facilities in their colleges were available, but they were insufficient and needed to be upgraded to enable users to use the potential of the new information and communications technology. Teacher no.5 mentioned the importance of supplying this equipment with most of the appropriate software available in the market. In regard to the human resources, all the computer teachers felt that the human resources were moderately adequate and they should be more prepared for teaching such courses. Teacher no.4 mentioned that most computer teachers in most colleges were enlisted from the science or mathematics departments as co-operative teachers, which is not appropriate.

Teacher no.1 suggested that computer teachers need to be provided with up-to-date computer resources such as magazines, books and software, to be aware of the new and fast development in computer technology.

9.4.3.1.5. The computer teachers' opinions about the new plan for computer training courses:

A question was addressed to computer teachers about the new plan for making the new computer course compulsory for students in all departments in the college and their views about this plan.

All interviewees agreed about the importance of such a course. Teacher no.5 mentioned that the invasion of computers in all aspects of life made learning about computers very important for all students. Teacher no.4 reported that adding a computer course to the college curriculum for all students is a good step, but it needs a follow up, bearing in mind the rapid growth of computers. Teacher no.3 suggested that once the computer courses have been added to the college curriculum, they need to be reviewed regularly and updated.

9.4.3.2. Views about teaching staff need for computer training:

Interviewees were asked to express their thoughts about the teaching staff desire and needs for computer training and the TCs role in introducing such training.

9.4.3.2.1. Teaching staff need and desire to be computer trained:

In regard to their colleagues' need to be computer trained, and their desire to learn about computers, four of the CTTC interviewed indicated that TS in all college departments have a great need to learn about computers and only one said that they have a moderate need. Teacher no.3 was the only person who believed that teaching staff have a moderate need to be computer trained. He indicated also that teaching staff in the other departments have real need only to learn about the general use of computers.

9.4.3.2.2. Teacher College role in training teaching staff:

Computer teachers were asked if the teacher colleges where they worked organised any computer training courses.

The results indicated that four Teacher Colleges organised some computer training courses for their TS, ranging from 6 weeks in Riyadh TC to one semester in Taif TC. The number of TS who enrolled in these courses was between 20 in Jazan Teacher College and 10 in Taif Teacher College. However, Teacher no.3 stated that even though the computer course started with ten teaching staff, only two teaching staff continued until the end of the semester. Teacher no.2 reported that the college where he works did not organise any computer training activities for their teaching staff.

All interviewees supported the idea of introducing some computer training for all TS in each college, regardless of their area of study or age.

9.4.3.3. Suggestions and comments:

Interviewees were finally asked to add any comments or suggestions that felt relevant to the topics. Three out of the five CTTC took this opportunity and made the following suggestions:

1) Teacher no.2 suggested that tutors in the computer laboratory should be appointed in each college to give students the opportunity to practise on computers after the end of the class.

2) Teacher no.3 made a few suggestions such as:

A) Each college should organise an annual exhibition and invite specialists in educational technology to demonstrate new developments in software and hardware, to help people in the college and outside it to learn about the new technology.

B) Among the requirements for appointing Graduate assistants for follow up study, should be familiarity with at least computing and one foreign language.

C) The college should subscribe to computer magazines, since this is one of the best ways to deliver and teach new aspects about computers and related technology.

D) Each TC should be connected to the Internet via on-line service to facilitate the Internet search services for TS.

3) Teacher no.5 suggested that a computer technician should be appointed for the computer laboratory to prepare the software and the hardware for the each class and

to carry out maintenance.

9.5. <u>Summary:</u>

There was a high level of agreement among groups of interviewees, in their ideas on the current status and future prospects for computer education, at both school and college level.

Clearly, the importance of computers as an administrative tool, as an educational aid, and as a social phenomenon, was widely recognised, and initiatives have been introduced to reflect this importance by introducing computers in educational institutions.

There was, however, general agreement that what has been done so far falls short of what is needed. Training programmes have until recently been targeted only to certain groups, for example, science and mathematics students, and in the case of training courses for teachers, there has been a problem of low take-up and high drop-out rates. Although students' and teachers' attitudes toward computers were generally thought to be positive, it was suggested that for some, computer anxiety is a problem.

Several reasons were put forward for the perceived inadequacy of computer training in schools and colleges, including class sizes, particularly in the Arts divisions, and facilities in colleges were considered inadequate.

The problem of inadequate technical resources was seen as qualitative, as well as quantitative; problems of computer maintenance were mentioned, and a need was suggested for much of the equipment to be upgraded, to take advantage of recent developments in software.

Another problem is lack of sufficient specialist teachers capable of conducting computer training efficiently.

The results obtained from the previous three chapters, six, seven and eight, and the results presented in this chapter, will be discussed together in the next chapter, in the light of the literature.

CHAPTER TEN

SUMMARY, DISCUSSION AND RECOMMENDATIONS

Chapter 10

Summary, Discussion and Recommendations

10-1. Introduction:

Teacher training institutes are expected to meet the need for computers in some form in their training programmes to produce graduates who are confident and competent to use computers in their teaching (Downes, 1993). Many educational systems have already integrated some courses for information and communications technology, while others go further by implementing policies for teachers to be awarded a teaching qualification. In Britain, for instance, according to Opie (1998a) from 1981 a major issue has been the need for ICT in schools to prepare pupils to use computers in their learning. From that time on, large sums of money have been expended to equip schools with computers. Appleyard (1997) reported that over the year of 1996 about £130 million was spent on computers, of which about £32,000 was spent on each secondary school alone. The "National Grid for Learning" is another measure in the UK to enhance teachers' use of ICT skills and to encourage development of teaching materials related to ICT (Opie, 1998a). Furthermore, from September 1998 in order for all trainee teachers to receive qualified for teaching qualification are required to achieve standards laid down in the new curriculum for information communication technology (Adams, 1998).

However, for a country like Saudi Arabia (SA), where the educational system was established only 50 years ago and the quality of primary school teachers' preparation programmes still does not meet the aspirations of the policy-makers in the educational authorities, despite the introduction of the Teacher Colleges (TC) in 1989, the situation is different (See Chapter 2).

10.2. Summary and discussion:

This survey research, as indicated in chapter one, was basically designed to investigate the computer-training needs for teaching staff (TS) and students in Teacher Colleges (TCs) in Saudi Arabia (SA). Understanding these issues will facilitate the introduction and the use of computers and stimulate the consciousness and utilisation of computers by staff and students, leading in turn to more effective use of computers in primary schools, when the TC students graduate and take their new skills with them to their professional posts.

The findings obtained from a survey of 147 TS and 472 students in regard to the variables mentioned in the previous chapters (Chapters 6, 7 and 8) and the information drawn from the three sets of interviews are brought together and discussed in the light of theoretical and empirical evidence presented in the previous chapters. At the end of the chapter, in the light of conclusions drawn from this study, some strategies and recommendations are made for measures to improve computer training and use in TCs in SA. Suggestions for further research are also offered.

It is worth mentioning here that the field study was conducted between the September 1997 and February 1998 (see Chapter 5), before the wide spread introduction of the Internet in SA

Since the study is dealing with two different, but related samples, teaching staff and students, and since the teaching staff perceptions about computers and their use will affect and influence their students' insights, as suggested by Akbaba et al. (1998) and Adams (1998), results are discussed together, starting with findings related to the TS and followed by results from the students.

In order to provide clarity in the analysis, the comments in this chapter are arranged under headings which coincide with the order in which the variables were investigated earlier: experience with computers, knowledge about computers, computer training need, respondents' attitudes toward computers and availability training and resources (human and physical).

10.2.1. Teaching staff and students experience with computers:

In relation to TS and students' computer experience several variables were discussed (see Chapters 6 and 7), such as familiarity with different types of computers listed, type of computer training respondents received, place of computer training, purpose of computer use and average number of hours spent working on computers, availability of access to computers, and source of learning about computers.

10.2.1.1. Teaching staff experience with computers:

In regard to the TS and their computer experience, the findings indicated that a quarter of the respondents had no experience with any type of computer mentioned in the survey, about a third had received no computer training and a large percentage (76%) made little use of computers, less than 4 hours a week (see Tables 6.7A, 6.9A and 6.13A).

Although the results indicate that the TS are seriously lacking computer experience, these results, nevertheless, reveal a more favourable picture than was found by Fodah (1990) and Al-Mohaisin (1993). The higher percentages of TS computer users in this study compared with those of Fodah and Al-Mohaisin might be attributed to the time differences between the three studies, since the impact of information technology on the learning environment has both expanded and accelerated in the last few years, especially after the wide spread introduction of the Internet and World Wide Web.

Comparing the results found in this study with similar results found in the developed countries, the current results appear to indicate lower computer use than results reported by Blankenship (1998). However, other studies such as Opie (1998a), Marcinkiewicz (1994), Waxman et al. (1993) and Reinen et al. (1993) reported low computer use among their respondents. Thus, lower computer use is not a problem of SA alone.

As a result of the low experience and computer use, TS in TCs in SA reported moderate to low familiarity with all the computer applications listed for them and about one third of all respondents indicated unfamiliarity with all computer applications. The most popular computer applications among them were word-processing and Graphics: 54% and 31% respectively (see Table 6.14A).

Most earlier studies reviewed reported higher percentages of use of word-processing, as a basic computer operating proficiency than in this study: the same was true of data bases and spreadsheets (Byrum, 1993 and Maier, 1998). The results indicate that only around a quarter of respondents in this study expressed familiarity with these applications, (see Table 6.14A).

The only personal factor significantly associated with the TS's computer experience, computer use and familiarity with computer application was the department of work. TS in science and mathematics departments showing more computer experience and computer use, and expressed more familiarity with computer applications than their colleagues in other departments. These findings are not surprising, since Blankenship (1998) reported that respondents teaching mathematics and science showed more computer use than their colleagues who teach social studies and arts (Figure, 3.3 p. 3-12). Similar results were also reported by Larose et al. (1999), who found that respondents in the colleges of applied science and administration integrated computers in their teaching more than their colleagues in the colleges of theology, ethics and philosophy. Therefore, respondents in scientific departments may be expected to take the lead regarding integration of computers in their teaching and to show more computer use.

10.2.1.2. <u>Students' computer experience:</u>

Students in this study also reported low computer experience and computer use, shortage of computer training and low familiarity with computer applications. About one third reported no experience with computers and 27% indicated no computer training at all. Only one out of ten reported that they used computers for 4 hours or more weekly, about four out of ten expressed unfamiliarity with any computer applications and low percentages revealed familiarity with the applications listed (see Tables7.7A, 7.9A, 7.13A and 7.14).

Whereas Adams (1998) reported low computer use among his PGCE students (86% of his population reported using computers with their pupils only once or never), the students in the current study did not use computers at all in their teaching, since the majority (84%) revealed that they had not been computer trained at the colleges where they studied. The interesting point in comparing the two results was that Adams noticed that younger students in his study were illiterate in ICT and no significant associations were found between the students' age and previous field of study. However, in this study computer experience and computer use were significantly associated with the students' age and background, in favour of younger students and students with a science background (see Table 7.7B). The literacy of younger students in this study might be a result of the noticed sociocultural changes in the Saudi society, as in other societies, with a trend toward technology and acquiring computers as a symbol of modernity, as well as a wider recognition of their usefulness (Al-Mohaini, 1996).

Variation in ages, in level of study, qualification and department of study affected significantly the students' computer experience, use, familiarity with computer applications and availability of access at college and at home. Younger students with a science background, studying in the scientific departments showed more computer experience and use, were more familiar with computer applications and had more access to computers at home and at college. The factor of college location had no significant association with these variables.

Variations between the students were expected, since, as suggested by Crawford (1998), if students came from different backgrounds and from different schools with different preparation, they would differ in their computer experience. This view is supported by the results of Blackmore et al. (1992) who reported a high variation across both institutions and courses. Whereas the present study agrees with previous research in finding differences related to students' department of study, level of study, ages and qualifications, it is at odds with them in finding little difference among college locations. This is because, although the students in the current study attended different TCs, all these TCs followed the same regulations, were directed by the same administration, taught similar students, served similar purposes and had similar, if not identical, curricula (see p.5-32), in line with the high level of centralization and standardization in Saudi education generally.

10.2.2. <u>The effect of access to computers on the respondents' computer experience, knowledge and attitude:</u>

There is a great debate about the importance of availability of access to computers and the role access might play in raising the computer use, computer knowledge and confidence in using computers among teachers. Even though Becker (1993) and Pelgrum et al.(1993) suggested that access to computers makes little difference to computer use, some studies (Geaster et al.,1993, Smith, 1998, Hohensee, 1998 and Levine et al. 1998) found significant associations between availability of access to computers and computer use, experience and even confidence.

Findings in this study revealed that availability of access to computers at college among TS and students at TCs was less than moderate, since only about a third of the TS and only about one in ten of the students had such access. About half of the TS and a quarter of the students reported ownership of a computer at home (see Table 6.12 and 7.12A).

Availability of access to computers at college and at home significantly affected respondents' computer experience and computer use and the TS familiarity with word processing, as seen in Tables 6,12E, 6.13B, 6.14C, 7.10D and 7.13D. Those who had access to computers at college or at home reported higher computer experience, more computer use and more familiarity with word processing than those without access to computers. The results of the computer knowledge test were also significantly associated with the availability of access to computers at college and at home, since those respondents who had access performed better in the test and answered more items correctly, as seen in Tables 6.19C and 7.18E.

Other significant relationships were reported between computer ownership or availability of access to computers at college and the mean scores of three attitude sub-scales, WANT, ANXIETY and ENJOYMENT, especially among students. Those students who have access to computers at college or own a computer at home reported higher mean score in the three sub-scales (see Tables 8.31, 8.32 and 8.34). These results led to the conclusion that exposing students to computers in college or at home lead to more enjoyment, strong interest and less anxiety, since ownership of computers provide students with more time to learn skills, trouble shoot and review materials at their own convenience (Gay 1997).

Thus, the findings of this study are in agreement with those studies mentioned above, which suggest that ownership of a computer and availability of computers at school or college were positive factors for improving computer experience, encouraging respondents' computer use, raising computer knowledge and giving respondents more favourable attitudes to computers.

Although many studies emphasised the importance of availability of access to computers at home and at work as a major factor for more computer use, as reported by Gay, (1997), Smith (1998) and Levine et al. (1998), others argued that access to computers is not enough. Providing technical support and giving respondents the opportunity to identify and select the appropriate resources to fulfil their needs would lead to more ICT use (Williams et al., 1998).

However, the problem in TCs in SA is the serious shortage not only in physical resources but also of human resources, as reported by the Students' Affairs Dean (SAD), Taif Teacher College Dean (TTCD), Vice Dean of Riyadh Teacher College (VDRTC) and Computer Course Teachers (CCT). Therefore, the problem is doubled, but applying computer training, encouraging educators to own a computer to benefit from it in their free time, providing technician support and enhancing the motivation to use the computer, could help to solve this problem.

Different strategies could be used to fulfil the demand of providing respondents with more computers at home, such as employing technicians and experts in computer technology, even from foreign countries, if there is a shortage in the Arab countries, as mentioned by the TTCD. Those technicians could help respondents making decisions as to the purchase of appropriate technology. Other possible strategies include providing TS and students with free or low- cost on-line services, contributing to the cost of equipment, asking the private sector to contribute to the cost, and arranging annual exhibitions by the private sector. Moreover, appropriate support should be provided for TS and students to solve the problems that they might encounter when dealing with technology, such as trouble shooting, maintenance, etc.

Looking to the developed countries, almost all these strategies have been applied. It is worth noting here that a budget of £20 million has been set for three years in England, to pay £200 for each teacher to buy a home computer and this amount will cover 100,000 teachers (Kenny et al., 1999). A similar scheme in Scotland is expected to be announced soon. Scottish teachers would get a personal computer by 2003. Various other countries have similar plans. For instance, the Australian State of Victoria offered its 36,000 teachers a laptop for about £180 with payments spread over three years and the Swedish government plans to give 60,000 teachers 40% of the total cost of a multimedia computer (Johnston, 1999). To ensure the success of the smart schools in Malaysia, the Ministry of Education budgeted a sum of RM 12 million for the setting up of multimedia computer laboratories at all 31 teacher training colleges (Bin Osman, 1998). Moreover, agencies such as, for instance, the National Grid for Learning, mentioned earlier, the Teacher Training Agency (TTA), and the Virtual Teacher Centre (VTC) in Britain have been set up to support teachers seeking advice or assistance in dealing with information and communications technologies devices.

Therefore, to promote computer ownership and use among TS and students in TCs in SA, similar schemes for supporting ownership and availability of similar centres to provide a technician devices should be established.

10.2.3. The teaching staff and the students' source of learning about computers:

When TS and students were asked about the sources of obtaining information and advice about computers, results revealed that friends, books and course work were the main sources for TS, since 35%, 31% and 28% respectively showed that. Course work and friends were the main sources for students (63% and 33% respectively). Other sources, such as newspapers and computer magazines, colleagues, computer centres, video and television were cited as sources for getting such information by small numbers of respondents, ranging from 20% to 6% (see Tables 6.17A and 7.17A). It is worth mentioning here that the findings revealed significant differences between respondents (TS and students) in the sources they cited. Those working or studying in the science or mathematics departments learned about computers mostly from course work, whereas those from theoretical departments were more likely to have learned from friends. Age group and qualifications affected the students' selections, since younger students with a science background indicated that they learned more about computers from course work. Obtaining information about computers from appropriate sources, such as course work and books, is important, since respondents who learned about computers from these sources did better on the knowledge test, suggesting that those are reliable sources of computer information.

Even though computer courses were part of the secondary school curriculum for all students in different divisions, students with a science background were more exposed to computer learning via course work than students with an Arts background. Furthermore, about 40% of all students indicated that they did not learn from computer courses. The Computer Studies Supervisor (CSS) in Taif Educational District commented on this problem and he mentioned that student overcrowding in the Art division classes, maintenance problems and problems with electricity supply, especially in the rural schools, might contribute to decreasing students' opportunity for computer practice, and therefore make it difficult for them to gain from such courses (see p.9-22).

The College Computer Centre (the computer laboratory) was a source of computer learning for only 26 students (6%). Far more than this number might have been expected to learn from this source, since students in the Science and Mathematics departments are required to attend courses on the use of computers. However, this might suggest that the computer training courses in the colleges may not be sufficiently attractive or helpful for students to regard them as a major source of computer learning.

These results for the TS were similar to results obtained by Fodah (1990) in relating to the three sources friends, books and newspapers and computer magazines, if the last two sources, books and magazines, are accumulated together, as in Fodah's study. However, respondents varied in relating to learning from course work, and film and television. This variation might have come as a result of this study including additional sources, such as colleagues and computer centres, or it might have been as a result of inclusion in Fodah's study of administrators, who represented about half her sample.

The present study results were also consistent with those of Bukhari et al. (1992), in regard to reliance on books and computer centres. However, respondents in this study showed greater dependence on computer magazines for obtaining information about computers than those in Bukhari's study, probably because more computer magazines have been available in recent years.

These results indicated that TS and students obtained information and advice about computers from various sources, as mentioned by Tully (1996) and these sources need to be supported and enhanced to encourage familiarity with technology in general and computer use in schools particularly. In this connection, one of the interviewees suggested that TCs should subscribe to computer magazines to provide TS and students with up-to-date information on educational technology (see p. 9-29). In the researcher's experience, subscribing to newspapers and computer journals tends to be neglected in TCs, so TS are deprived of a potential opportunity to keep up to date with developments in their field. Furthermore, Al-Sadan (1997) noticed that about a quarter of his respondents considered the lack of appropriate scientific journals as one of the main obstacles in TCs. Therefore, he recommended providing TS with the opportunity to keep up to date with developments in their field.

10.2.4. Teaching staff and students' computer knowledge:

Investigating the respondents' knowledge relating to computers, the results indicated that TS had moderate computer knowledge, since the percentages of right answers to the seven- multiple test knowledge items ranged between 68% for item 6 to 51% for item 7. Even though the test, as mentioned before (see p. 5-15), consisted of seven items related to basic computer knowledge, as prescribed by the test founder (Fodah), the results were disappointing. Only 13% of the TS and less than 5% of the students could answer all these items correctly and about one tenth of both, the TS and the students, could not answer any items correctly (see Table 6.18B and 7.18B).

These results are close to the results obtained by Fodah (1990) except for item six, where the percentage of correct responses was about one and a half time that of Fodah's study. Therefore, the mean score of the TS test in this study was slightly higher, but the mean score for students was lower (4.17 for TS and 3.25 for students in this study to 3.9 for Fodah's study). In other words, after almost a decade, there appears to be no significant improvement in computer knowledge, which does not speak well of the effectiveness of current computer courses.

However, the lack of knowledge about computers is expected, since, as mentioned by Al-Mohiasin (1993), Al-Mohiani (1996) and Al-Sadan (1997), lack of computer training, lack of availability of physical resources and shortages of expertise and technician manpower are serious problems in SA. Shortage of expertise and technician manpower was also mentioned by the TTCD, as an obstacle for computer training and computer use among TS and students in the near future (see p. 9-14). Yaghi (1996), Reinen et al. (1993) Bauder et al. (1993) and Al-Mohaisin (1993) suggested that if computer use is to be encouraged, respondents' computer knowledge needs to be raised. Department of work/study, computer experience, computer use and students' age group, qualifications and level of study had significant effects on respondents' ability to answer the computer knowledge test correctly (see Tables 6.19B, 6.19C, 7.18D and 7.18E).

Although the computer knowledge of the TS and the students, according to the results mentioned above was low, TS and students showed great eagerness to learn about computers and their use in education, as emerged from answers to items 9 and 10 in the computer experience section (Appendix A, p. A-3). When TS and students were asked about the type of computer course preferred for training, about three quarters of each of the TS and the students indicated the need for an optional or compulsory one term computer course (see Tables 6.15 and 7.16). Similar results were found when respondents were asked if they were interested in being computer trained since the majority (90%) gave positive responses (see Tables 6.16 and Table 7.15). These results indicate the urgent need for computer training as perceived by the respondents themselves, even though this will add heavily to their workload.

10.2.5. <u>Teaching staff and students' computer training needs:</u>

Ascertaining the perceptions of the respondents about computer needs was thought to be one of the appropriate methods to assess their computer needs as suggested by Dick and Reynolds (1998). Therefore, as part of the investigation, students and their teachers were asked about the computer topics that they believed they needed to be trained on.

The results in general revealed that TS and students were similar in their rating. Most items were rated with high to moderate need (e.g. 80% of the TS and 62% of the students rated the item *Knowing about the Internet* with Great Need, while 43% of the TS and 30% of the students did so for the item *Knowing how to apply the computer to diagnose students' ability*), as seen in Table 6.20A and 7.19A.

All respondents rated *"Knowing how to benefit from the Internet"* as their main priority, consistent with the increasing demands for the Internet as a vehicle to make learning and teaching more efficient. Even though the Internet service was not available in SA at the time when the study was conducted, the great advantages of the Internet and the possibility of its introduction in SA, attracted both TS and students to give it priority.

The results also indicated that TS accorded programming and computer languages the same position they had in the 1980s, with the topic *Knowing about programming* receiving second priority. This result gives the impression that TS were interested to know about programming, even though the focus of computer users has changed dramatically from programming to applications particularly since the early 1980s (Dershimer &Dershimer 1991). Moreover, with the many technological advances of the last few years, there has been a shift from teaching educators only the mechanics of how to operate technology, hardware and software, to helping them to learn how to use technology to improve their teaching and learning (Espinoza, 1996). TS's training priorities do not reflect this shift, leading one to wonder if they were actually aware of changing trends in relation to computers, or if their answers were influenced by outdated ideas of what ICT in education is about. However, students rated the need to learn about programming only fifth (see Table 7.19A).

Both sets of respondents agreed in rating the topic *"Learning about the computer history and development"* lowest. This topic was also rated least by respondents in Fodah's study in (1990). The consistency between the two groups in dismissing this topic suggests the attention of respondents is focused more on the effective use of computer in its role as a tool for human advancement and learning (Levine et al. (1998).

Agreement was found also between respondents in this study in rating the topic *"Knowing how to get information in and out of a computer"*, with 68% of the teaching staff and 64% of the students rating this topic as a priority. Other topics such as knowing about the generic applications, such as word processing, data bases, spreadsheets and multimedia, were rated highly only by about half of the TS, even though Carifio (1995) regarded these topics as fundamental components of any computer literacy course. Moreover, these topics were suggested by most of the interviewees as important topics to be included in any computer training (p. 9-11. and 9-21). However, these topics failed to attract students. Students might not have responded to these items, because of lack of familiarity with them (Table 7.19A), as suggested by Francis-Pelton et al. (1997).

Respondents' personal characteristics and computer experience variables and ownership of a PC did not significantly affect their rating of computer topics, except for a few topics. The only interesting associations were found in students with a science background, who expressed more interest in learning about Multimedia and Databases (Table 7.19B). Wild (1996), Trushell (1995) and Oliver (1994), as basic needs for beginning teachers, suggested these students' interests. Knowledge of the machine and experience and skills in the use of various computer applications such as Word Processing, Spreadsheet, Database, Email and the Internet were topics suggested by the above studies as needed for student teachers, to enable them integrate technology into their teaching.

The high rating and the absence of significant differences among TS and students in almost all computer training need topics reflected the importance attached to these matters. If the TS in TCs are not well prepared with the skills needed to integrate computer technology into their teaching, such integration cannot be expected among their students, who will enter primary schools as qualified teachers, no better able or willing to exploit computers than their predecessors have been.

10.2.6. Teaching staff and students' attitude toward computers:

Each of the two groups, TS and students, had highly favourable attitudes towards computer training and high enthusiasm for computers, reflected in their scores on the scales, WANT, ENJOYMENT, ANXIETY, and NEED. For both TS and students, the mean scores were greater than the mid-point for all of the items making up the four attitude scales. Only a small number of all respondents scored less than 50, which reflects the highly positive attitude that respondents had towards computer training.

The high consistency of the respondents' agreement on these items indicated that TS and students had similarly favourable attitudes toward computers. The TS's characteristics and computer variables had no significant influences among the four attitude sub-scales, ANXIETY, WANT, NEED and ENJOYMENT, except for a few factors, which were believed to be Type One Errors. Although TS came from different college locations, with different nationality, working in different departments with different ages, they responded similarly to the four attitude sub-scales. These results gave the impression that all TS are in favour of computers, feel a need for them, and are alike in their enjoyment of them.

However, age, qualifications, departments of study and level of study and computer experience, computer use, ownership of a computer and computer knowledge significantly affected the students' attitudes to the sub-scales, ENJOYMENT, ANXIETY and WANT. Younger students with a science background, studying in the science and mathematics departments, in the first level, had better scores in the three sub-scales mentioned above than their colleagues; so did those with computer experience, who use computers more, or had access to a computer at home or at college. The sub-scale NEED was not affected by any of the previous variables. Therefore, it could be said that all students expressed a strong need for computer training, since all students respond highly to the NEED scale items.

These findings are consistent with related literature (Woodrow, 1992; Al-Jabri, 1996; Blount, 1997; Gunter et al., 1998; Levine et al., 1998). All these studies are in agreement that students' experience with computers, training on computers, and ownership of computers significantly affected their attitudes in a positive way, increasing their confidence and enjoyment, and reducing anxiety.

Therefore, to improve the TS's and students' sense of desire and need for computers, and to decrease their anxiety, appropriate training is clearly important.

10.2.7. Availability of computer training for teaching staff and students:

All interviewees, the decision-makers and the computer course teachers, were found to be relatively enthusiastic in their approach to computer training and supportive of the idea that TS and college students need to be computer trained and have computer skills (see p. 9-16 and 9-27). They felt that computers are, today, valuable as a teaching tool for teachers in all types of schools. Therefore, the decision- makers in the Ministry of Education in SA indicated that the problem of inadequate preparation of computer course teachers (CCT) was being attended to and all TCs were to be provided with well prepared

TS for computer studies. In the same manner, researchers insisted on the importance of training teaching staff and student teachers in the use of computers to encourage them to implement technology in their teaching (Reinen et al., 1993, Al-Mohaisin, 1993, Yaghi, 1996 and Blankenship, 1998).

Nonetheless, even though the Ministry are apparently attending to this issue training to use computers in the TCs in SA was found to be not available for most of the respondents, since only about 15% of each of the TS and the students indicated that it was (see Table 6.10 and Table 7.11). This result was not surprising, since in-service computer training programmes for TS in TCs are not available, except those which run via the Social Service Centres, as mentioned by the DMTC and TTCD. These courses, as it appears from their leaflets, are mostly concerned about the general use of computers, keyboard functions, word processing, spread sheets and databases. They are organised for general services and to serve people with different needs, not targeted to TCs students or TS (p. 9-17). Moreover, there is no obligation for TS to use computers, or even to have at least a minimum capability in their use, let alone to use them in their teaching, as mentioned by the DMTC (Chapter 9, p.9-15).

Only half of the students indicated that they had been computer trained in the secondary schools (see Table 7.11), even though computer courses were compulsory for all students in the secondary school as mentioned by the (CSS) (see p. 9-22). However, even though the CSS explained this problem in terms of various factors, mentioned earlier (p. 10-12), these reasons do not fully explain the situation. The main problem, as mentioned by one of the students in an informal meeting, which was held by the researcher before the field study, was that the way of introducing the computer courses in the secondary school, in his view, was not appropriate. Therefore, the student suggested that any computer course planned for college students should not be introduced purely theoretically, as had been the course in secondary school. He declared that he, as well as other students in his class, had worked on computers just a few times during three years of study in the secondary school. The Taif Educational District Director (TEDD) mentioned also the maintenance problems and shortage of some equipment (p. 9-22). Another problem is the shortage of qualified computer teachers, which exists in the secondary schools not only in SA, but also in almost all the Arab countries, as mentioned by the TTCD (p. 9-13).

Similar results were reported from those students studying in the science and mathematics departments in TCs. In view of the fact that computer courses are part of the college curriculum for students in the science and mathematics departments, (see p. 2-35), only16% of the students indicated that they had actually received computer training at the college (see Table 7.11). These results about the computer courses are worrying. The same problems which were said to decrease the students' familiarity with computers in the secondary school, may have affected students in the TCs. These include lack of well-prepared teachers, lack of physical resources and teaching theoretically more than practically. In each TC there are 20-25 computer machines, while the average number of students in the class range from 65 students in the mathematics department to 46 students in the science department, according to the number of candidate students for all TCs in 1999 (Table 2.14). Consequently, the number of students is between two to three times that of the available computer machines, even if all the machines are operational.

Further, four of the Computer Course Teachers indicated that these courses were mediocre and needed to be redesigned to be more adequate. In spite of the many changes that have occurred in computing between 1992 and 1999, the objectives and the content of the course "Introduction to Computer" for the year 1999 (p.2-36) contains the same components as that for 1992. For instance, despite the fact that nowadays many operations and applications have user friendly interfaces, learning about DOS and computer languages are the main part of the curriculum of the introductory computer course. As mentioned above (p. 10-17), from the late 1970s to the beginning of 1980s, in the developed countries the focus has changed from programming to computer applications and moreover, there has been a shift from teaching about computer technology to teaching about how to use computers in the classroom. However, in existing course content there is no mention of the use of computer in the classroom. Moreover, the courses, until 1997, were provided only for students in the science and mathematics divisions, while students in other departments had no such opportunities available to them.

However, the Teacher Colleges Committee realised the importance of introducing all students to a computer literacy course (see p. 2-36). The outline of the module, as seen in Table 2.16, covers several of the important topics in the information and communications technology area. Moreover, most of the topics identified by this study and rated by respondents as highly desirable are included; only a few topics, such as spreadsheets, database management and multimedia are not included. These omissions may be few in number, but they are serious. Respondents in this study identified these topics as being important and about one third rated these topics in the "Great Need" category (see Table 7.19A). They are also among the important components identified in the literature (Oliver, 1994, Trushell, 1995 and Wild, 1996).

Looking to the objectives of this module in p. 2.39, it can be seen that they are very wide, and a course of three to four hours will not be enough to cover these objectives. Moreover, students who lack computer experience, do not use computers and are unfamiliar with most computer applications (as seen in Tables 7.7A, 7.13A and 7.14), need more intensive practical training, rather than theoretical. As seen in Table 2.16 half of the semester hours were deserved for theoretical learning. Therefore, this plan needs to be revised and the objectives need to be scrutinized, with a view to making the module more practical, valuable and enjoyable for the students.

The main purpose of computer training would be, as defined by Rosen, (1995) and Espinoza, (1996) to understand what computer technology is able to achieve, how it can enhance students' understanding, simplify the teacher's work load and provide enjoyment. However, the computer course module has not been taught to date (the beginning of the year 1999-200), because of deficiencies in both human and physical resources, as mentioned above, and no changes have yet been made to the computer resources. Therefore, the researcher suggests that, to enhance the students' understanding, simplify the teacher's workload and provide enjoyments for students, the computer course module plan should be revised.

According to the literature review (see Chapter 4) and according to the TS and students in TCs assessment of needs, such a computer literacy course should cover the basic computer proficiencies needed for teachers to help them to utilise ICT in their teaching effectively. These proficiencies were defined to include three main topics: familiarity with productivity tools, knowing how to use the computer as a communications resource, and understanding the way computers can be used to enhance the teaching of subject components. Productivity tools should cover word processing, spreadsheets, and database management; multimedia; and computer assisted learning applications such as drill and practice, simulations and tutorials. The computer as a communications resource is defined to cover the use of e-mail and mailbase for conveying messages and providing support; computer conferencing; and use of the World Wide Web, not only in teaching, but also for research purposes. Researchers have made calls for teachers to be compulsorily trained in those areas (Cotton, 1991, Bayard, 1995, Hirumi, 1996, Maier, 1998 and others). Therefore, these topics could be formulated in outline for a compulsory computer course for all college students. This course should be required at the beginning of the professional sequence to allow students to use the acquired technology throughout their pre-service training, as recommended by Raiford et al. (1995). However, to encourage students to use computers more, systematic integration of technology should occur throughout the undergraduate curriculum. The students in TCs study two courses of teaching methods, one for general concepts in teaching methods and the other for specific concepts related to each subject. Therefore, some concepts about the use of technology in teaching in general and in specific subject matter, such as computer- assisted learning and computer based learning, could be integrated to these courses, as suggested by Al-Mohaisin 1993 and Weibe 1995, to give students an appropriate opportunity to practise some examples of these techniques, as part of this course. This later computer practice might systematically encourage students to integrate computers into their teaching practice experience and will help the teaching method courses teachers to obtain some knowledge about how to integrate computers into the classroom.

The importance of integrating technology into the subject curriculum requires careful consideration of computer-based subject training for the teachers of teaching method. Therefore, these teachers have to determine the most appropriate ways to respond to these pressures and to be well prepared in dealing with these aspects.

The basic components for computer training described for students above were important also for those TS who lacked computer experience, but these basic skills might not be enough for some TS, especially for teachers of teaching methods. Thus, such training for the TS should be organised and formulated according to TS need. This training could be structured as short workshops or seminars, since TS usually lack the time to attend long training courses, as reported by Williams et al. (1998). The results of this study revealed that the majority of the TS (90%) expressed high interest in taking computer classes, as mentioned above (see p 10.15).

It is worth mentioning here that the explosion of news and information on the World Wide Web is causing concern to many governments in the developing and developed countries, leading them to set controls on the medias, as reported by the group's 22^{nd} annual survey of press freedom, entitled "Censor Dot Gov." (Reuters 2000). As a result of this the report mentions that 63% of the world's countries, one of which is SA, restrict print and electronic journalists. The government has carried out its mission to uphold Islamic rules and social values by preventing exposure to sites considered to undermine Islam, public morals or providing pornography or material that is sexually explicit (Gardner 2000). Gardner mentioned also that the authorities in SA approached this problem by establishing a special organisation to monitor all Saudi Internet traffic. A special node, run under the supervision of the King Abdul-Aziz City of Science and technology (KACST), was built to control pornography on the Internet. All the country's Internet Service Providers are linked into a central node in the capital city of the Kingdom. The Director of this unit believes that to prevent the conservative and religious culture of the Saudi people from offensive sites and sites that could stir up religion hatred, the node unit is succeeding in blocking all the major subversive ideas or undisciplined sites (Gardner 2000).

Even with such restrictions in place, administrators of girl's schools still object to allowing the Internet into their institutions (Sami 1999). The researcher has learned also through officials in the Presidency for Girls' Education that although an introductory computer course was added to the female TCs curriculum currently, about two years ago, the course did not include any topic about the Internet or the use of computers as a teaching tool or a communication device.

Sami, (1999) suggests that administrators of girls' schools were apprehensive about the violent temptation of the Internet. Sami believes also that this apprehension is at least justified. She reported that many girls aged between 15 to 25 years old in SA come to the Internet, in a special branch for women surfers, to engage in chat rooms, which is against the Islamic religion rules and the Saudian social values, especially if it is with the other gender. In this researcher's opinion male students might be exposed to this temptation too, and the appropriate solution for such a problem is the production of computer training programmes for teachers to be able to lead their students to more effective computer learning without any being offended by the pornographic sites. Teacher's attitude, teaching styles and preparations are vital factors for developing IT capability (Opie 1998b).

Moreover, all teachers need to be well prepared morally, culturally and adequately trained in general and in the computer use to enhance their students' ability to use computers in line with their religious rules and social values, and not to expose them to sites deemed to weaken their beliefs and their social values.

However, the successes of such training in computer use needs a well equipped computer laboratory, with good instructional tool and appropriate human resources to enable TS and their students to acquire, at least, the operational aspects of computer literacy (Lee et al. 1998). The availability of such resources is discussed in the following part.

10.2.8. Availability of human and physical resources:

Although, in SA, most of the universities have recently begun to develop campus-wide access to information technology, moving to this from a main-frame dominated environment (Bukhari et al., 1992), information technology equipment in TCs is still very low. As mentioned by the CCT in TCs, access to computers is available but it is insufficient (p.9-26). This point was also mentioned by TTCD and the VDRTC, when they indicated that the low level of equipment might be one of the main obstacles to introducing appropriate computer training for TS and students in TCs (p.9-14).

The computer machines available in TCs, as reported by the interviewees and indicated by special reports provided directly from TCs, are 20-25 IBM compatible machines with 486 SX33 processors and one megabyte of RAM. Each machine is equipped with a disk drive, and has a hard-disc capacity of 80 to 250 MB. No CD-ROM is available in these machines and none are connected with any on-line service or to any network services. These machines are very slow and weak in capacity for loading many of the current computer applications. Besides, they are available only to serve students in the science and mathematics departments, who enrol in computer courses.

The Ministry of Education has, however, recognised the problem of insufficient equipment and plans to supply the colleges with some new computer machines, such as the VDRTC mentioned in his interview (p. 9-13). He reported that three new computer laboratories had been established in three TCs in 1997, when special departments for preparing computer teachers were established in each of the Riyadh, Dammam and Jeddah TCs. He mentioned also that each computer laboratory consisted of 26 highly equipped computer machines (though this is still only a small number) and each machine works separately. However, there is still the question, who will use these machines: the students in the Computer Studies departments, the students in other scientific departments or the students in the all other departments? Moreover, the TS will have little or no chance to use these machines.

Under this configuration of the equipment, the cost of operating these machines will be high, since each machine needs to have a separate licence for running the software. Furthermore, Internet and Web browsing capabilities are still not available.

Even though Barnard (1998) reported that there was no clear link between resource level and frequency of computer use to assist learning, respondents in his study stated that resources were the factor primarily responsible for their difficulty in using CAL. Crawford (1998) suggested that insufficient IT resources might be one of the factors, which made the IT curriculum in English state secondary schools in general unsatisfactory. It seems that SA has faced the same problem and, even with the planned upgrading, colleges will still be inadequately equipped.

The second obstacle that faces the use of computers in TCs in SA is the software. Software used in all TCs, according to data supplied by the CCT at TCs, is confined to generic packages such as Word Processors, Databases and Spreadsheets with an Arabic interface. CCT reported, also, that most computer teachers teach computer studies in traditional "teacher-centred" ways, because of the unavailability of the appropriate software and because of the shortage of access to computers. Even though most of the primary school curriculum themes are accessible in instructional computer programs and available on the market, none of these programs were inserted in the curriculum of the computer courses, perhaps because of their high cost (Al-Mohaisin, 1993). However, students in TCs should be encouraged to use some of the valuable computer software which is available for primary schools, to be able to integrate these packages into their teaching in the future.

Such software is available in English in various subjects and could be translated into Arabic, or similar packages could be built specifically for the SA environment.

However, these obstacles could be solved with the co-operation of the computer specialists in the National Universities in SA and by borrowing, with permission, some of the appropriate software packages available in the developed countries, and modifying them to be appropriate culturally for the SA context. Moreover, the recent spread of the Internet in SA may go some way towards addressing these problems, as users will be able to find some relevant software by browsing on the Internet, some of which can be downloaded free of charge. It is worth noting here that, for instance, the Software Publishers Association in the USA estimates that K12 schools spent an average of about $11,000 each on software in the 1993-1994 school year (OTA, March 1995). This may give some ideas of the level of resource commitment that may be needed in SA if it is to integrate computers effectively into its education system.

The third part of the problem of resourcing is related to human resources. The results of interviewing the computer teachers (see p. 9-8) revealed serious deficiencies in the preparation of class computer teachers. Four out of five of the teachers responsible for teaching the computer courses in these colleges were just drawn from the Mathematics or Physics departments, with very little preparation in teaching about computers as a subject. They were trained only for a short time, at best six months, and in few cases only two weeks, on how to operate computers.

10.3. Conclusions and implications:

Several conclusions can be drawn from the findings of this study. The respondents in this study and the literature reviewed expressed a high need for computer training for pre-service student teachers and their teachers to be able to cope with current and future development in the area of information technology. For preparing future teachers to use the potential of the information age, their teachers must become proficient users of ICT. It is not enough for educators in teacher preparation to acquire the basic elements of technology: they have also to acquire some knowledge in this field to be able to transfer this knowledge to their students and to convince them to use it in their future teaching (Dick and Reylonds 1998).

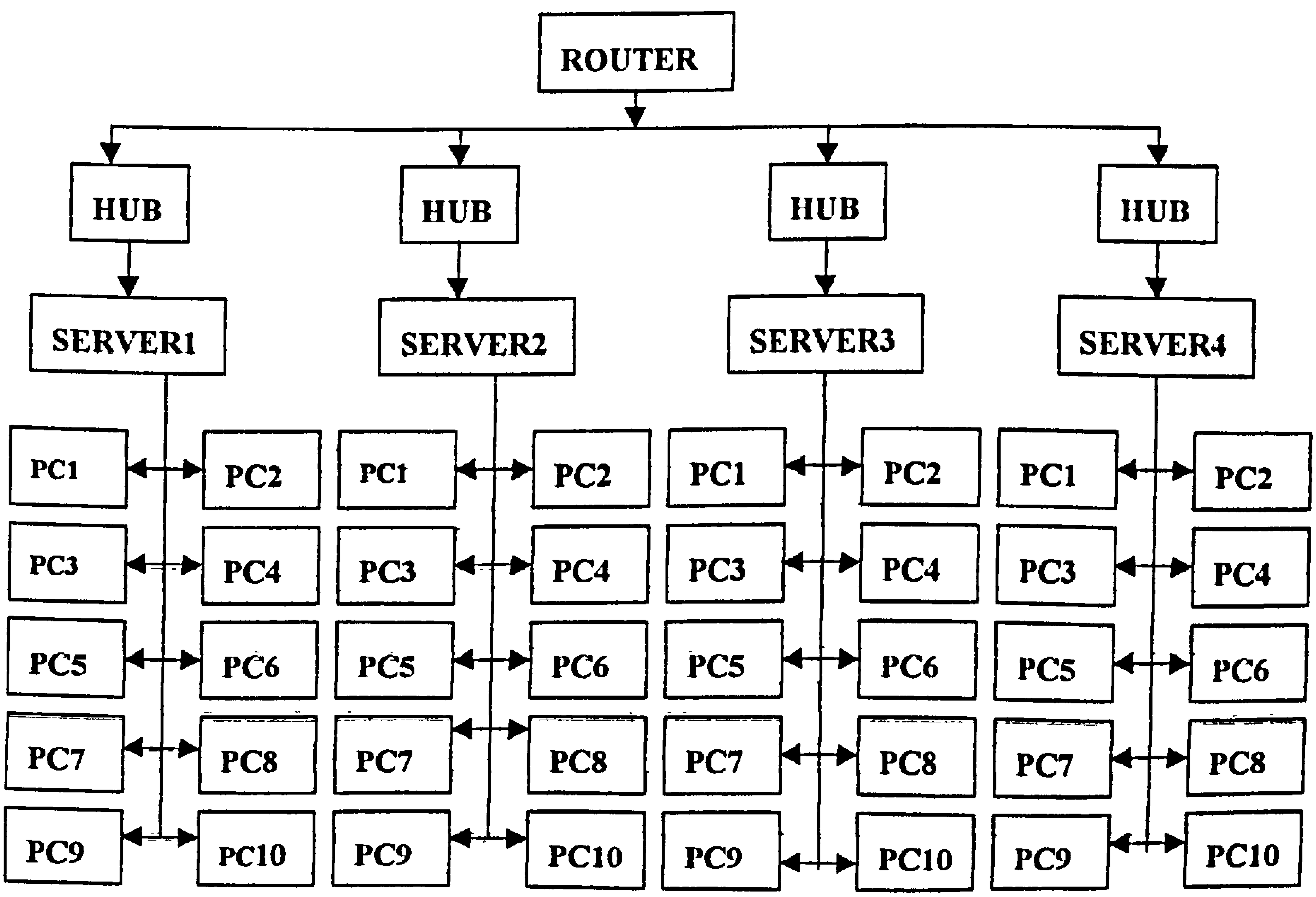
The study revealed that students in TCs and their teachers had a great lack of computer experience and computer knowledge, and made little or no use of computers in their teaching. Respondents who indicated some computer use, used it for general purposes. Deficiencies in computer resources and lack of computer training existed among students and among their teachers. Nevertheless, they expressed a positive attitude and enthusiasm toward computers and their utilisation.

However, for TCs to prepare their students and to raise the level of their staff involvement, intensive training and high quality infrastructure of equipment are necessary.

As mentioned in Chapter 1(p. 1-8) the raised demand for the superhighway technology in SA, as in other countries, needs teachers highly qualified in ICT not to teach theoretical concepts about technology, but to be able to deal with this technology practically as well as the developed countries. Therefore, what is needed is the provision of a high level of equipment and services infrastructure and a variety of software to serve all types of TS and students. Lee et al. (1998) suggest that a teacher without a well equipped computer lab, and with insufficient instructional tools, will not be able to show the operational aspects of computer literacy.

Therefore, a local area network should be devised and built in each TC to provide appropriate use of computers among TS and students.

Figure 10.1: A schematic representation of the proposed infrastructure



Various types of network infrastructure designs could be implemented. However, the above network proposal (shown in Figure 10.1) would be the most practical to implement within a typical TC in SA in the light of its IT budget and the anticipated usage of the network. The network would consist of 40 PCs, using cat. 5 cables and fast switches. It is proposed that the entire network be split into four Local Area Networks (LAN), which could be expanded to more as needed; each LAN cluster would constitute of 10 PCs. The four servers could be assembled in one room for large numbers of users at one time or they could be located in different places for different groups to work at the same time.

In order to manage the files, disk space, network utilities etc. each LAN would be supported by, for instance, a Dell 2300 Power edge server, hosting the usual server software. The network PC would be a modern, state of the art machine and would be accompanied by the peripherals and utilities listed in Table 10.1.

Table 10.1: The minimum requirements for a computer machine to be connected to the propose Local Area Network

Equipment		Lower characteristics
Hardware	**Desktop machines**	**128MB, 600Mhz processor,10Gb hard disk, 56bps modem or higher**
	Scanner	
	Printer	
	Digital camera	
	Data projector	
	Interactive whiteboard	
Software	**Operating system**	**Windows 95 or higher**
	Office system	**Office 97 or higher**
	Anti-virus	**S-Prot, PC-Guard**
	Internet browser	**Netscape Navigator or Internet explorer.**
	Web authoring package	**Front Page, Express or Adobe Page Mill**
	Painting packages	**Paint Shop Pro, Paint Brush or Harvard Graphics**

Such equipment would enhance the value and use of computers and would facilitate communication between the students themselves and with their teachers. Moreover, these facilities will open the world of the information and communications technology to the students and their teachers, to enable them to benefit from the Internet and to navigate the World Wide Web, which is full of interesting and valuable teaching and learning materials. Although most of the material included in the WWW is written in the English language, this need not be an obstacle, since about one fifth of the TS have studied in the USA or in Europe and are able to communicate with the English Language (see Table 6.4A). Also, a lot of material has been written in Arabic.

The procedures used to procure this equipment would naturally be under close scrutiny to ensure that TCs obtain maximum benefit from their equipment and value for public money.

There would be no problem in funding such project, since the Deputy Ministry for Teacher Colleges mentioned a plan for providing each TC with the equipment needed to facilitate computer use among its teaching staff and students (see p.9-17).

However, merely buying extra computer machines will not solve the problem of deficiencies in integrating and implementing information and communications technology in teaching and learning, without the availability of well prepared human resources. The provision of equipment means investing in development of human resources, which is the most important economic and social factor in society.

Therefore, TCs need well- prepared computer teachers and expert staff capable of training and supporting their colleagues and supervising their students, in learning not only about the use of computers as a communication tool, but also how to integrate computers in their teaching. However, shortages in computer technicians and expertise might appear not only among the Saudi society, but also among the Arab countries as a whole, as reported by TTCD. Thus, different approaches could be applied to provide TCs with appropriate human resources.

First, by implementing a fast-track scheme for developing expertise in the field of information and communications technology, with special attention being paid to the use of computers as learning tools and communication vehicles. The experts produced by this fast-track system will implement the introduction of computers in the school and college curriculum and train teachers to use computers in their teaching with more confidence. Therefore, special programmes should be organised to produce the necessary expertise in higher education establishments in SA or by sending suitable students abroad to gain relevant experience. The SAD mentioned that some arrangements of this kind had started (see p 9.13); however, these arrangements were only in the cities where universities were located; therefore, TS from other TCs need to be included in such training programmes.

The second approach to meet the urgent demand for technology is to appoint experts and computer teachers from other countries. Both of these steps should be taken to enhance the role that TCs should play, not only in preparing primary school teachers, but also "to be the pocket of expertise" as mentioned by the TEDD (p 9. 20). If shortages in qualified technicians occur in the Arab countries, as mentioned by TTCD, qualified technicians could be located from developed countries and there would not be any political or cultural obstacles to importing such, since many experts from different countries already work in SA in various jobs.

As a third approach to enhancing the use of computers among TS not only in TCs, but among teaching staff in all level of schools, education authorities in SA should issue a clear statement on the need for all their teaching staff to acquire information technology skills. For this strategy to be more effective, dates and targets for accomplishment should be defined and appropriate courses in information technology for teachers and approved training providers should be accredited. These accredited courses should be promoted for all teachers in all education sectors in the country, to enable them to cope with the development of technology and not to lag behind development in modern sciences.

It is worth noticing here that teachers are the key element in integrating computers into education and their trainees are the links to prepare future teachers to do it. Therefore, if trainees are not convinced of the need to integrate and use computers in their teaching, their students will continue to avoid using them and in the end students and society will suffer. Teachers need to convince administrators of the great need to implement technology in their teaching. Therefore, those who favour the use of computers must work to inform those in authority of the value of computers. This will require much time and effort and commitment to research, to realise the real benefits of computers in education.

Teachers also should seek self training or training via private bodies to gain the necessary computer knowledge to be able to convince their administrators of the benefits of this technology. Even though some respondents might not accept this approach, the indications from the current study are favourable, especially among TS. About one third of all TS had acquired some computer knowledge by themselves and about 16% had undertaken some computer training via the private sector (see Table 6.10). Among students, one in ten had sought each of these training types (see Table 7.11). Therefore, some arrangement could be made by the TCs or through the Teacher Administration in the Ministry of Education with the cooperation of the national universities or through private sectors to provide computer training for the TS, who will carry out the training for their students.

Moreover, the atmosphere of primary schools should be encouraging and promising, so future teachers will find a proper ambience to develop and apply their information technology capability for more effective learning. Well qualified head teachers and well-prepared administrators, librarians and teachers in the schools and availability of access to information technology equipment will be positive factors to encourage the new teachers develop confidence and competence in the use of information and communications skills in the classroom.

Even though this study was, as mentioned in Chapter 1 (see p. 1-15) limited to TS and students in male TCs, all these implications could be applied to TS and students in female TCs, especially since no computer courses are being taught to girl students in female' TCs, as mentioned above (see p. 10-27). There are strong similarities between the two types of school (male and females TCs), in purposes, in curricula, system of studying and the level of teaching, etc. though they are under two different supervisory bodies (Mosa

1994). Male TCs are under the supervision of the Ministry of Education, whereas female TCs are regulated by the General Presidency for Girls' Education. As mentioned in Chapter 2, segregation between males and females in SA is corresponds with the religious, cultural and social restrictions.

With all these issues in mind, the following section offers recommendations and suggestions for implementing computer ideas and strategies in TCs.

10.4. Recommendations of the study:

The information obtained from both interviews and questionnaires, consistent with the findings from the literature review, indicated the importance of training teachers at all levels of study and in all subjects to use computers in their teaching as a teaching tool or at least for communications. All respondents insisted that computer training was necessary and that teachers should be encouraged to exploit computers to the full in their teaching. As a result, several recommendations can be made for enhancing computer training for TS and TC students in SA and encouraging computer use.

1) The positive attitude that TC students expressed toward computers and the high demand for computer training should be met with sufficient computer training programmes. Therefore, **the first and most important recommendation of the study is that educational technology courses, particularly courses demonstrating how information and communications technology can be used as a communication and/or teaching tool must be made available in TCs, for all students.** The students will need a full course to

be integrated into the college curriculum. The computer literacy course should covered all main topics mentioned above (see p. 10-25), such as productivity tools, computer as communications resource and integrating the use of the computer to support the subject matter. This course should be compulsory, especially seeing that the majority of the students expressed strong interest in taking computer course (see Table 7.15). Moreover, this course should be introduced for the students in the beginning of their preparation programme to enable them gain continue practice through their studying.

2) Since similarities were found between the TS and their students' ratings of the computer need topics, their computer experience, computer use and computer knowledge, **a module in the form of workshops or seminars should be organised for TS to be taken in their free time. Each of the three topics above could be formulated in a workshop for a few days to meet the current needs, while also building in flexibility.** However, it is worth mentioning here that computer training needs might differ in the future, especially for the TS, as they become more aware of the computer's different uses and as they differ in their computer experience. Therefore, this module should be defined according to their computer experience and revised regularly, to keep it up-to-date with the rapid developments in educational technology, in general, and particularly in information and communications technologies.

3) In association with the previous recommendations, it is recommended that TCs must be provided with qualified human resources to lead the process of implementing technology in the right direction. Different strategies were described above (see p 10.37), which could be implemented and applied by decision makers for providing TCs, as soon as possible, with well qualified teachers and technicians in the field of information and communications technology.

4) For the previous training strategies to be applicable and for later use and implementation, **a Computer Centre should be established in each TC, equipped with sufficient computer facilities, which must include Internet services.** The CCT mentioned that computer equipment is currently available, but it needs to be upgraded. Therefore, the provision of an adequate infrastructure (equipment and services) for all students and TS, is essential. A schematic representation of the proposed infrastructure was shown in Figure 10.1 with the requirements for computer machines to be connected to a Local Area Network with accompanying peripherals and utilities listed in Table 10.1, which would serve this purpose. Equipping TCs with appropriate infrastructure for the students and their teachers to be capable to benefit from the Internet will not be excessively costly, and the decision- makers in SA are willing to provide TCs with the equipment that they need (see p.9-14).

5) Equipment for information and communications technology infrastructure, in-service training and appropriate software must be available for teachers in the primary schools to enhance their ICT experience and to encourage them to implement technology in their teaching. Such implementation will encourage TC students to acquire information and communications technology skills and exploit their potential by implementing them in their teaching. It will also help the primary school students to learn about technology to satisfy their needs, meet their families' ambitions and fulfil educational requirements. The TEDD emphasised the importance of training primary school teachers in computer use, and moreover, he expressed his strong desire to see all primary school teachers capable of implementing information and communications technology in their teaching (see p. 9-19). Funding such a project will be affordable, since about 20% of the general government budget in SA in 1995 (31,942 billion SR) is reserved for education and about 80% of that amount was intended for the general education (Al-Sonbol 1996). This budget gives the impression that education is receiving special attention from government. It is worth noting here that the schools in the UK, for instance, spent in the year of 1998-1999 about £286 million to procure ICT to be available at the level of one computer for each 13 students in the primary schools and one for each 8 students in the secondary schools (Becta, 2000).

6) For future teachers to find a proper ambience to develop and apply their information technology capability and for more effective learning **head teachers, school supervisors and administrators must be exposed to some information and communications technology training programmes.** Such training will be helpful for these people to be familiarised with information and communications technology so that they can fully co-operate with implications and implementations of the new technology. A sympathetic attitude might not be enough to guarantee the successful implementation of technology, but support and engagement of administrators in this implementation is essential. Therefore, special in-service computer training programmes are needed for all people working in schools. According to the CSS and the TEDD, teachers in the primary schools were attracted to and sympathetic about learning about computers (see, p.9-18)

Moreover, to increase confidence and encouragement for more computer use in schools, head teachers, supervisors and administrators should be provided with computers, free or at a special price, for use in the school or at home. For instance, in Britain on October 1999 an announcement was made that every new head teacher would be provided with a free Laptop, (Kenny et al., 1999).

7) Since availability of access to a computer at home or at college was found to be significantly associated with computer experience, computer use and computer knowledge, and these findings are consistent with those of other studies, **TS and TCS students should be encouraged to own personal computers in order to enhance their information and communications skills.** Various strategies have already been described above, for encouraging ownership of computers among TS and students (see p10.10).

8) Since computer magazines and books were found to be a major source of learning for respondents in this study, consistent with Fodah (1990) and Bukhari's et al. (1992) findings, **libraries and research centres should be provided with such up-to-date resources.** This approach is affordable, since the library has an annual budget, part of which could be set aside to provide resources about computers, such as books, annual journals and magazines etc.

10.5. Suggestions for Further Studies:

The following future research is suggested:

1) Since this study was restricted to TS and students in male TCs in SA, similar studies should be conducted in other teacher institutes in the country, such as female TCs and Colleges of Education.

2) The population of this study was drawn from pre-service training institutes; therefore, a similar study should be conducted for in-service teachers.

3) The attitude, computer experience, computer use of TS and students in secondary sector also needs to be investigated.

4) The computer training needs of intermediate and primary schools should also be investigated in detail.

10.6. Closing remarks:

It is important to realise that today's new technologies have more to offer education than earlier ones because they can change the relationship between people and knowledge by facilitating human interaction (Daniel, 1997). Information and communications technology and the use of computers in education in general and in particular in the field of teacher preparation and training during the last twenty years have received great attention from educators in the developed countries. Widespread discussion has been initiated about the function of computers in schools. It emphasises not only the academic capabilities of the computer, but also its social, cultural and psychological impact within the school context. The shift towards the integration of computers into education, both as a classroom learning tool (although this trend seems, so far, to have been underestimated by Saudi planners and educationalists) and as a professional tool for teachers, has created an increased demand for computer training for teachers. Such training is essential if computers are to become a successful and long-term component of education.

The rapid growth of education in SA comes as a response to the high demand from society, which has been met with strong interest from the educational authorities. However, the demands for the next generation might focus on the development of information and communications technology aspects, especially in the light of the impact of the Internet. Therefore, to meet the high demand of the information age for the coming century, information and communications technology needs to be deployed in schools to keep abreast of the major changes in the world educational system, of which the educational system in SA is a part. Such implementation should lead to better education and more successful teaching and learning.

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APPENDICIES

Appendix (A)

COMPUTER TRAINING NEED ASSESSMENT
AND ATTITUDE SURVEY

TEACHER COLLEGE STAFF QUESTIONNAIRE

Dear college staff:

This questionnaire is part of a study investigating the need for adding information technology (computers) to the curriculum of teacher colleges in Saudi Arabia and to study the students' attitude toward this technology.

In view of the important role that college staff play in evaluating and assessing these needs, their ideas and views relating to this matter are very important.

In this questionnaire, you will find several questions and statements regarding this matter, and you are kindly requested to respond to them.

Please put down what you really feel and if you do not want to mention your name, feel free not to do so.

Would you please complete all details by / /1997, when I will come to collect the questionnaire from you.

Thank you in advance..

The researcher

Mohammed G. Al-Joudi

Taif Teacher College

Taif P.O. Box 504

Section 1: Participant Characteristics

Please write in the relevant details or, where response options are given, place an (x) by the category that best describes you:

1.1 Name: (optional) ....

1.2 College: ____________________ Department: ____________________

1.3 Nationality: ☐ Saudi ☐ Non Saudi (please specify) _______

1.4 Age: ☐ 21-24 ☐ 25-28 ☐ 29-32 ☐ 33-36 ☐ 37-40 ☐ 41-44
☐ 45 or more (please specify) _____

1.5 Position at college: ☐ Professorial ☐ Lecturer ☐ Graduate Assistant
☐ Administrator ☐ Other (please indicate) ________

1.6 Last qualification: .... Year Option: ....
Place of Study: .... Field of Study: ....

1.7 Years of Experience: Inside college: .... Outside college: ....

Section 2: Experience with Computer

In this section, for each question, tick all answers that apply:

2.1 I have had experience with the following computers:
☐ Microcomputer ☐ Minicomputer ☐ Mainframe computer
☐ I have no experience on computers.

2.2 I can use the following computer language(s):
☐ BASIC ☐ FORTRAN ☐ Pascal ☐ COBOL ☐ Logo
☐ None of the above

2.3 My computer training has included:
☐ Workshop(s) ☐ Short course ☐ Full term course(s)
☐ I have not attended any training courses.

2.4 I have taken the computer training at:
☐ High school ☐ College ☐ Private Institution ☐ By practising myself

2.5 I usually use a computer for:
☐ Work ☐ Leisure ☐ Both ☐ I do not use a computer at all

2.6 In an average week, I use a computer for:
☐ 0 hours ☐ 1-3 hours ☐ 4-6 hours
☐ More than 6 hours (Please specify) _________________

2.7 I can use the following computer applications:
☐ Word processing ☐ Database management
☐ Record Keeping ☐ Spreadsheet

☐ Accounting | ☐ Programming
☐ Graphics | ☐ Instructional programs (CAI)
☐ Desk-top publishing | ☐ I cannot use any of the above applications

2.8 If a computer course was organised, I would prefer it to focus on (please list three of the applications mentioned above, in order of priority).

1. __________
2. __________
3. __________

2.9 I would prefer the following course format:
☐ Short course (6-10) weeks
☐ Optional one term course.
☐ Compulsory one term course.
☐ No need for computer course

2.10 I would describe my interest in computer training as follows:
☐ I have taken computer classes and I do not need any more training.
☐ I am interested in taking a computer class (or additional computer classes)
☐ I am not interested in taking any computer classes.

2.11 I have learned the most about computers from:
☐ course work ☐ friends ☐ college computer centre
☐ video and television ☐ books ☐ departmental colleagues
☐ newspapers and computer magazines

2.12 My access to computer is:
☐ At college ☐ I own one at home.
☐ My friend (relative) has one I use. ☐ I have no access to computer.

Section 3: Knowledge of Computer

For each statement below, choose the best answer by circling one of the letters:

3. 1 Computers are not good for tasks that require:
   a. Speed
   b. Accuracy
   c. Intuition
   d. Something to be done over and over again.
   e. I do not know.

3. 2 The main duty of a computer programmer is to:
   a. Operate a computer
   b. Prepare instructions for a computer.
   c. Schedule jobs for a computer.
   d.Design computers.
   e. I do not know.

3. 3 Computer software is a term that describes:
   a. Computer program.
   b. Electronic components covered with soft plastic.
   c. People who work with computers.

d. Mechanical and electronic parts of a computer system.
e. I do not know.

3. 4 The physical parts of a computer are referred to as:
a. Program.
b. Hardware
c. Software.
d. Manuals.
e. I do not know.

3. 5 A computer program is:
a. A course on computers.
b. A set of instructions to control the computer.
c. A show given by the computer.
d. A piece of computer hardware.
e. I do not know.

3. 6 An operating computer:
a. Follows a set of instructions written by people.
b. Thinks just like a person.
c. Decides what to do with the data.
d. Translates data from digital to analogue code.
e. I do not know.

3. 7 A computer needs two types of information to solve a problem:
a. The problem and the answer.
b. The name of the program and user number.
c. The data and the instruction.
d. The name of the program and your name.
e. I do not know.

Section 4: Computer Training Needs

Please rate your need for computer training in each area by circling the response that most closely corresponds to your assessment for each topic:

4= Great need
3= Some need
2= No need
1= Cannot answer-No Knowledge

4.1 Knowing how to program in a computer language.	4 3 2 1
4.2 Knowing how to get information in and out of a computer.	4 3 2 1
4.3 Knowing how to select educational computer software.	4 3 2 1
4.4 Learning about the history and the development of computers.	4 3 2 1
4.5 Learning about the role of computers in society.	4 3 2 1
4.6 Knowing how to use a computer as a high-interest drill and practice vehicle	4 3 2 1
4.7 Knowing how to use a computer as a means of teaching problem solving	4 3 2 1
4.8 Knowing how to use the computer to help with class housekeeping chores (i.e., attendance, student record)	4 3 2 1
4.9 Knowing how to apply the computer to evaluate students' abilities	4 3 2 1
4.10 Knowing how to apply the computer to diagnose students' needs	4 3 2 1

4.11 Knowing how to use multimedia. 4 3 2 1
4.12 Knowing how to use spreadsheet. 4 3 2 1
4.13 Knowing how to use word processing. 4 3 2 1
4.14 Knowing how to use database. 4 3 2 1
4.15 Knowing how to use computer for presentation. 4 3 2 1
4.16 Knowing how to benefit from the Internet. 4 3 2 1

Section 5: Attitude toward computers

Please select your response by circling the numbers:

4= Strongly agree
3= Agree
2= Disagree
1= Strongly disagree
0= Cannot answer- No knowledge

No	Statement	SA	A	D	SD	CA
5.1	I would like to learn more about computers.					
5.2	I am nervous when using a microcomputer.					
5.3	I enjoy playing computer video games.					
5.4	I feel comfortable using a computerised account card.					
5.5	I would very much like to have my own computer.					
5.6	I am looking forward to any workshop that covers the topic of microcomputer uses in school.					
5.7	I feel uneasy working with mechanical or electrical gadgets.					
5.8	I would like to use a computer at my school/work.					
5.9	I enjoy working with computers.					
5.10	Working in a room filled with computers would make me feel uneasy					
5.11	I feel uneasy when I am with people who are talking about computers					
5.12	I feel confident about my ability to use a computer.					
5.13	Computers are gaining too much control over people's lives					
5.14	Microcomputer use in schools is a fad					
5.15	All TC teachers should learn about computers.					
5.16	All TC students should learn about computers.					
5.17	Computers should be used in learning many subjects beside mathematics and science.					

Section 6: Suggestions and comments

In the space below, would you pleas add any suggestion, opinions, or any information related to the computer training need and students' and staff's attitudes to computers.

COMPUTER TRAINING NEED ASSESSMENT AND ATTITUDE SURVEY

COLLEGE STUDENTS QUESTIONNAIRE

Dear college student:

This questionnaire is part of a study investigating the need for adding information technology (computers) to the curriculum of teacher colleges in Saudi Arabia and to study the students' attitude toward this technology.

In view of the important role that college student can play in evaluating and assessing these needs, their ideas and views relating to this matter are very important.

In this questionnaire, you will find several questions and statements regarding this matter, and you are kindly requested to respond to them.

Please put down what you really feel and if you do not want to mention your name, feel free not to do so.

Would you please complete all details by / /1997, when I will come to collect the questionnaire from you.

Thank you in advance..

The researcher

Mohammed G. Al-Joudi

Taif Teacher College

Taif P.O. Box 504

Section 1: Participant Characteristics

Please write in the relevant details or, where response options are given, place an (x) by the category that best describes you:

1.1 Name: (optional) ....

1.2 College: ....

1.3 Level of Study: ☐ First ☐ Second ☐ Third ☐ Fourth

1.4 Department of Study: ☐ Quranic Study ☐ Islamic Study ☐ Arabic Lang
☐ Social Study ☐ Physic. Ed. ☐ Mathematics
☐ Science ☐ Art ☐ Comp. S

1.5 Age: ☐ 17-20 ☐ 21-24 ☐ 25 or older (Please Specify) ....

1.6 Qualification: ☐ Science High Sch. ☐ *Literature High Sch.*
☐ Religious High Sch or Equ. ☐ Teacher T.I

Section 2: Experience with Computer

In this section. for each question, tick all answers that apply:

2.1 I have had experience with the following computers:
☐ Microcomputer ☐ Minicomputer ☐ Mainframe computer
☐ I have no experience on computers.

2.2 I can use the following computer language(s):
☐ BASIC ☐ FORTRAN ☐ Pascal ☐ COBOL ☐ Logo
☐ None of the above

2.3 My computer training has included:
☐ Workshop(s) ☐ Short course ☐ Full term course(s)
☐ I have not attended any training courses.

2.4 I have taken the computer training at:
☐ High school ☐ College ☐ Private Institution ☐ By practising myself

2.5 I usually use a computer for:
☐ Work ☐ Leisure ☐ Both ☐ I do not use a computer at all

2.6 In an average week, I use a computer for:
☐ 0 hours ☐ 1-3 hours ☐ 4-6 hours
☐ More than 6 hours (Please specify) ________________

2.7 I can use the following computer applications:
☐ Word processing ☐ Database management

☐ Record Keeping ☐ Spreadsheet
☐ Accounting ☐ Programming
☐ Graphics ☐ Instructional programs (CAI)
☐ Desk-top publishing ☐ I cannot use any of the above application

2.8 If a computer course was organised. I would prefer it to focus on (please list three of the applications mentioned above, in order of priority).

1. ___________
2. ___________
3. ___________

2.9 I would prefer the following course format:
☐ Short course (6-10) weeks
☐ Optional one term course.
☐ Compulsory one term course.
☐ No need for computer course

2.10 I would describe my interest in computer training as follows:
☐ I have taken computer classes and I do not need any more training.
☐ I am interested in taking a computer class (or additional computer classes)
☐ I am not interested in taking any computer classes.

2.11 I have learned the most about computers from:
☐ Course work ☐ Friends ☐ College computer centre
☐ Video and television ☐ Books ☐ Departmental colleagues
☐ Newspapers and computer magazines

2.12 My access to computer is:
☐ At college ☐ I own one at home. ☐ My friend (relative) has one I use.
☐ I have in another place (Please specify: ----) ☐ I have no access to computer.

Section 3: Knowledge of Computer

For each statement below, choose the best answer by circling one of the letters:

3. 1 Computers are not good for tasks that require:
   a. Speed
   b. Accuracy
   c. Intuition
   d. Something to be done over and over again.
   e. I do not know.

3. 2 The main duty of a computer programmer is to:
   a. Operate a computer
   b. Prepare instructions for a computer.
   c. Schedule jobs for a computer.
   d. Design computers.
   e. I do not know.

3. 3 Computer software is a term that describes:
   a. Computer program.

b. Electronic components covered with soft plastic.
c. People who work with computers.
d. Mechanical and electronic parts of a computer system.
e. I do not know.

3. 4 The physical parts of a computer are referred to as:
a. Program.
b. Hardware
c. Software.
d. Manuals.
e. I do not know.

3. 5 A computer program is:
a. A course on computers.
b. A set of instructions to control the computer.
c. A show given by the computer.
d. A piece of computer hardware.
e. I do not know.

3. 6 An operating computer:
a. Follows a set of instructions written by people.
b. Thinks just like a person.
c. Decides what to do with the data.
d. Translates data from digital to analogue code.
e. I do not know.

3. 7 A computer needs two types of information to solve a problem:
a. The problem and the answer.
b. The name of the program and user number.
c. The data and the instruction.
d. The name of the program and your name.
e. I do not know.

Section 4: Computer Training Needs

Please rate your need for computer training in each area by circling the response that most closely corresponds to your assessment for each topic:
4= Great need
3= Some need
2= No need
1= Cannot answer-No Knowledge

4.1 Knowing how to program in a computer language.	4	3	2	1
4.2 Knowing how to get information in and out of a computer.	4	3	2	1
4.3 Knowing how to select educational computer software.	4	3	2	1
4.4 Learning about the history and the development of computers.	4	3	2	1
4.5 Learning about the role of computers in society.	4	3	2	1
4.6 Knowing how to use a computer as a high-interest drill and practice vehicle	4	3	2	1
4.7 Knowing how to use a computer as a means of teaching problem solving.	4	3	2	1
4.8 Knowing how to use the computer to help with class housekeeping chores (i.e., attendance, student record)	4	3	2	1
4.9 Knowing how to apply the computer to evaluate students' abilities	4	3	2	1

4.10 Knowing how to apply the computer to diagnose students' needs.	4	3	2	1
4.11 Knowing how to use multimedia.	4	3	2	1
4.12 Knowing how to use spreadsheet.	4	3	2	1
4.13 Knowing how to use word processing.	4	3	2	1
4.14 Knowing how to use database.	4	3	2	1
4.15 Knowing how to use computer for presentation.	4	3	2	1
4.16 Knowing how to benefit from the Internet.	4	3	2	1

Section 5: Attitude toward computers

Please select your response by circling the numbers:

4= Strongly agree
3= Agree
2= Disagree
1= Strongly disagree
0= Cannot answer- No knowledge

No	Statement	SA	A	D	SD	CA
5.1	I would like to learn more about computers					
5.2	I am nervous when using a microcomputer					
5.3	I enjoy playing computer video games					
5.4	I feel comfortable using a computerised account card					
5.5	I would very much like to have my own computer					
5.6	I am looking forward to any workshop that covers the topic of microcomputer uses in school					
5.7	I feel uneasy working with mechanical or electrical gadgets					
5.8	I would like to use a computer at my school/work					
5.9	I enjoy working with computers					
5.10	Working in a room filled with computers would make me feel uneasy.					
5.11	I feel uneasy when I am with people who are talking about computers					
5.12	I feel confident about my ability to use a computer					
5.13	Computers are gaining too much control over people's lives					
5.14	Microcomputer use in schools is a fad					
5.15	All TC teachers should learn about computers					
5.16	All TC students should learn about computers					
5.17	Computers should be used in learning many subjects beside mathematics and science					

Section 6: Suggestions and comments

In the space below, would you pleas add any suggestion, opinions, or any information related to the computer training need and students and staff attitude to computer.

Appendix (B)

The key questions for interview with officials and Computer course teachers

1) **The Decision-makers:**

Q1: What computer courses were formerly provided in Teacher Colleges?

Q2: Who benefited from these courses?

Q3: What are your feelings about these courses?

Q4: What are the reasons behind introducing the new computer course for college students in all departments?

Q5: Do students in Teacher College need to learn about computers?

Q6: What do you think is their attitude to computers?

Q7: What is the level of hardware, software and human resources to meet the introduction of the new computer course?

Q8: Do you think Teacher Colleges will meet any obstacles to the introduction of the computer course? If so what are they?

Q9: What about the teaching staff in Teacher College? Are they familiar with computers?

Q10: Do they use computers in their teaching?

Q11: Do you think teacher staff in Teacher Colleges need to learn about computers?

Q12: What is your impression about the teaching staffs' attitude toward learning about computers?

Q13: Do you have any policy for the teaching staff to be computer trained and do you have any plan to promote their computer awareness?

Q14: Are there proposed computer training activities, and if there are, who administer these activities and who benefit from them?

The Teaching Staff's Questionnaire Form
(Arabic version)

٤) تعرف أجزاء الحاسوب بأنها :
أ- البرمجة **Programming** ب- الجهاز **Hardware** جـ- البرنامج **Software**
د- كتب التعليمات **Manuals** هـ- لاأعرف

٥) برنامج الحاسوب هو :
أ- مقرر عن الحاسوب ب- مجموعة تعليمات للتحكم بالحاسوب
جـ- عرض مقدم بواسطة الحاسوب د- جزء من الحاسوب هـ- لاأعرف

٦) الحاسوب عندما يشتغل فإنه :
أ- يتبع مجموعة من التعليمات مكتوبة من إنسان ب- يفكر مثل الإنسان
جـ- يترجم المعلومات من أرقام إلى بيانات تناظرية د- يقرر ماذا يفعل بالمعلومات
هـ- لاأعرف

٧) يحتاج الحاسوب إلى نوعين من المعلومات لكي يحل مشكلة :
أ- المشكلة والحل ب- اسم البرنامج ورقم المستخدم
حـ- المعلومات والتعليمات د- اسم البرنامج واسم المستخدم هـ- لاأعرف

الجزء الرابع : الحاجة إلى التدريب على الحاسوب :

الرجاء تقدير حاجتك للتدريب على الحاسوب وذلك بوضع (✓) في المربع الذي يتناسب مع تقييمك لكل موضوع من الموضوعات التالية :	حاجة كبيرة ٤	بعض الحاجة ٣	ليس هناك حاجة ٢	لا أعرف إطلاقاً ١
١ التعرف على البرمجة بإحدى لغات الحاسوب				
٢ التعرف على ادخال وإخراج المعلومات من وإلى الحاسوب				
٣ التعرف على كيفية اختيار البرامج التعليمية للحاسوب				
٤ التعرف على تاريخ وتطور الحاسوب				
٥ التعرف على دور الحاسوب في المجتمع السعودي				
٦ التعرف على استخدام الحاسوب كوسيلة شيقة للتدريب والمران				
٧ التعرف على استخدام الحاسوب لتدريس حل المشكلات				
٨ التعرف على استخدام الحاسوب للمساعدة في أعمال الفصل الإدارية (مثل حفظ الملفات والدرجات)				
٩ التعرف على استخدام الحاسوب في تقويم قدرات الطلاب				
١٠ التعرف على استخدام الحاسوب في تشخيص احتياجات الطلاب				
١١ التعرف على استخدام الوسائط المتعددة في الحاسوب **Multimedia**				
١٢ التعرف على استخدام منسق الكلمات **Word Processing**				
١٣ التعرف على استخدام قاعدة البيانات **Database**				
١٤ التعرف على كيفية استخدام الجداول الرياضية **Spreadsheet**				
١٥ التعرف على كيفية استخدام الحاسوب في عرض المعلومات				
١٦ التعرف على كيفية الاستفادة من خدمات شبكة المعلومات **Internet**				

(٥)

الجزء الخامس : الاتجاهات حول الحاسوب :

الرجاء وضع (✓) في المربع الذي يتناسب مع موقفك من كل عبارة من العبارات التالية :	أوافق تماماً ٤	أوافق ٣	لا أوافق ٢	لا أوافق تماماً ١	لا أستطيع الإجابة ٠
١ أرغب في أن أتعلم أكثر عن الحاسوب					
٢ أشعر بالتوتر عند استخدام الحاسوب					
٣ أجد متعة في قضاء الوقت عند استخدام برامج التسلية على الحاسوب					
٤ أشعر بالراحة عند التعامل مع الحاسوب في استخدام بطاقة الصراف					
٥ أرغب وبشدة في امتلاك حاسوب					
٦ أتطلع لأي دورات تقدم في الكلية عن استخدامات الحاسوب					
٧ أشعر بالارتباك عند التعامل مع المعدات الميكانيكية والإلكترونية					
٨ أود أن أستخدم الحاسوب في دراستي أو عملي					
٩ أشعر بمتعة عند العمل على الحاسوب					
١٠ العمل في غرفة مليئة بالحواسب يجعلني أشعر بالاضطراب					
١١ أشعر بالملل عندما أكون مع اناس يتحدثون عن الحاسوب					
١٢ أشعر بالثقة في قدرتي على استخدام الحاسوب					
١٣ بدأ الحاسوب في التحكم كثيراً في حياة الناس					
١٤ استخدام الحاسوب في المدارس عبارة عن موضة					
١٥ يجب أن يكون لدى أعضاء هيئة التدريس بكليات المعلمين معرفة في مجال الحاسوب وتطبيقاته					
١٦ يجب أن يكون لدى طلاب كليات المعلمين معرفة في مجال الحاسوب وتطبيقاته					
١٧ ينبغي استخدام الحاسوب في تعلم كثير من الموضوعات إلى جانب العلوم والرياضيات					

الجزء السادس : اقتراحات وملاحظات :

من فضلك يمكنك إضافة أي اقتراحات أو ملاحظات في الفراغ أدناه :

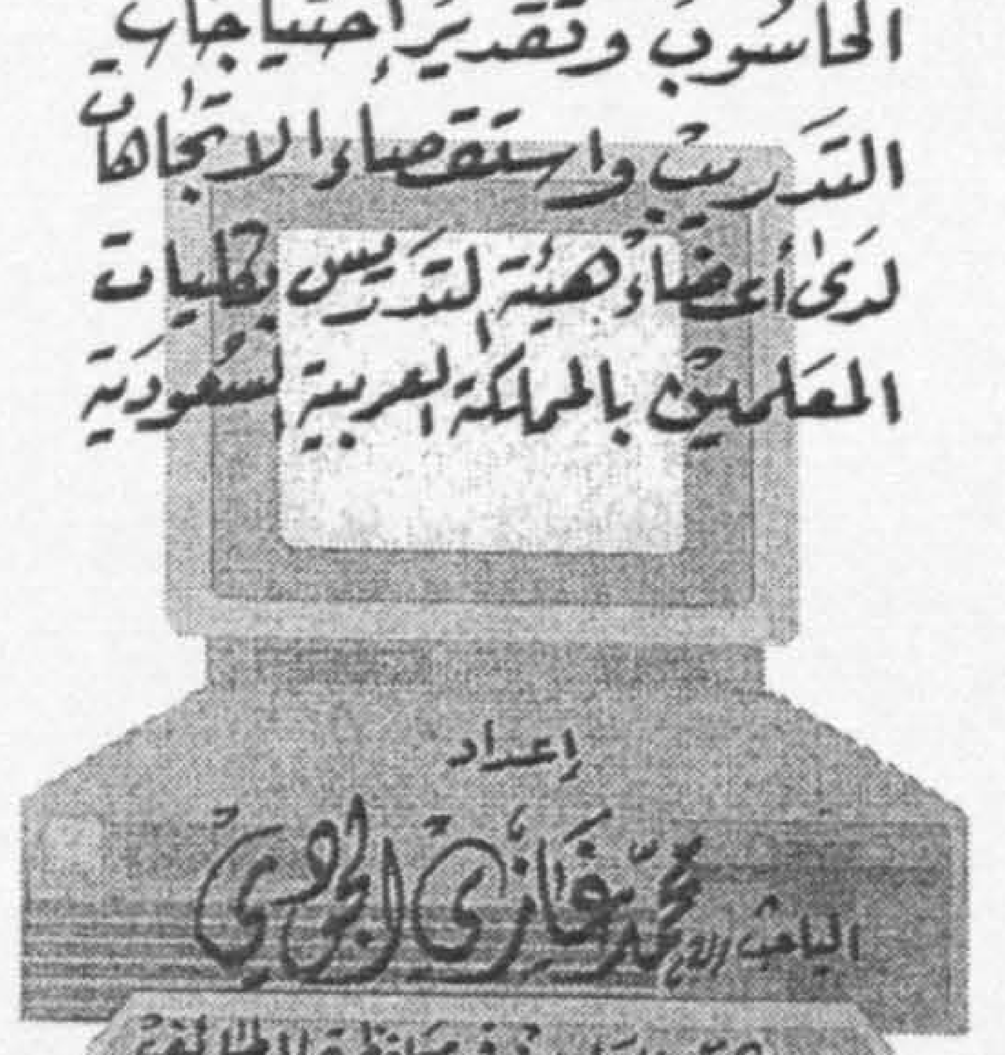
----

(٦)

بسم الله الرحمن الرحيم

استبانة

الحاسوب وتقدير احتياجات التدريب واستقصاء الاتجاهات لدى أعضاء هيئة التدريس بكليات المعلمين بالمملكة العربية السعودية



إعداد

الباحث محمد مغازي الجوهري

كلية المعلمين في محافظة الطائف
الطائف ص ب ٥٠٤

١٤١٨هـ-١٩٩٧م

نموذج (أ)

المكرم عضو هيئة التدريس بالكلية

السلام عليكم ورحمة الله وبركاته ... وبعد

هذه الاستبانة جزء من دراسة الغرض منها هو تقويم وتقدير مدى احتياج طلاب كليات المعلمين في المملكة العربية السعودية إلى الإلمام بمبادىء تقنية المعلومات (الحاسوب) والتعرف على مواقفهم تجاه هذه التقنية ومعرفة مستوى معلوماتهم في هذا المجال .

ونظراً لدور أعضاء هيئة التدريس في تقدير وتحديد احتياجات طلاب الكلية في هذا المجال ، فنحن بحاجة لمعرفة وجهات نظرهم حول هذا الموضوع ومعرفة مستوى معلوماتهم . لذا أخي الكريم تجد أمامك مجموعة من الأسئلة والاستفسارات ، آمل منك التكرم بالإجابة عليها . الإجابة التي تشعر بها حقيقة هي الإجابة المفيدة . لذلك ، من فضلك اكتب فقط الإجابة التي تمثل رأيك الخاص .

جميع البيانات التي تعطيها سأحتفظ بها شخصياً في سرية ، ولن يطلع عليها أي شخص آخر ، وإذا أردت عدم ذكر اسمك فيمكنك ذلك .

آمل منك التكرم بإكمال جميع بنود الاستمارة وتسليمها إلى سعادة وكيل الكلية في موعد أقصاه أسبوع من استلامها .

ولك مني الشكر والامتنان على حسن تعاونك .

أخوكم

الباحث : محمد غازي الجودي

كلية المعلمين بالطائف

الطائف - ص.ب : ٥٠٤

الجزء الأول : معلومات عامة : ضع علامة (✓) لتصف نفسك عند كل فقرة من الفقرات التالية :

١) الاسم (اختياري) ....

٢) الكلية .... القسم ....

٣) الجنسية : ☐ سعودي ☐ غير سعودي (حدد من فضلك) : ....

٤) العمر : ☐ ٢١-٢٤ ☐ ٢٥-٢٨ ☐ ٢٩-٣٢ ☐ ٣٣-٣٦ ☐ ٣٧-٤٠ ☐ ٤١-٤٤ ☐ أكثر من ٤٤ (من فضلك حدد) ....

٥) طبيعة العمل : ☐ عضو هيئة تدريس ☐ محاضر ☐ معيد ☐ إداري ☐ أخرى (رجاء التوضيح) ....

٦) أعلى مؤهل دراسي .... سنة الحصول عليه ....
مكان الدراسة .... التخصص ....

٧) عدد سنوات الخبرة في الكلية ☐ خارج الكلية ☐

الجزء الثاني : الخبرة في مجال الحاسوب :

ضع علامة (✓) على الإجابة التي تتمشى مع خبراتك السابقة في مجال الحاسوب :

١) لدي خبرة في أحد أجهزة الحاسوب التالية :

☐ الحاسوب الصغير (الشخصي الخاص والذي لايعمل ضمن شبكة Microcomputer)

☐ الحاسوب متوسط الحجم (الشخصي الذي يعمل مستقل ويمكن أن يكون ضمن شبكة عملية Minicomputer)

☐ الحاسوب الكبير (المكون من وحدة رئيسية وعدد من الطرفيات كالموجود في الجامعات Main Frame Computer)

☐ ليس لدي خبرة على الإطلاق

٢) أستطيع استخدام لغة (لغات) الحاسوب التالية :

☐ لغة البيسك BASIC ☐ لغة لوغو LOGO
☐ لغة باسكال PASCAL ☐ لغة الكوبول COBOL
☐ لغة الفورتران FORTRAN ☐ أخرى (حدد من فضلك) ....
☐ لاشيء مماذكر أعلاه

٣) تدريبي على الحاسوب شمل :

☐ ورشة معملية (فترة تدريب عملي قصيرة لعدد من الأيام Workshop)
☐ فترة تدريب قصيرة أكثر من شهر (Short training)
☐ مقرر (مقررات) لمدة فصل دراسي كامل أو أكثر (Full course(s))
☐ غيرها رجاء التحديد : ....
☐ أنا لم ألتحق بأي دورة على الحاسوب

٤) تلقيت تدريبي على الحاسوب في :

☐ المدرسة الثانوية ☐ الجامعة ☐ الكلية
☐ معهد خاص ☐ بالتدريب الذاتي ☐ لم ألتحق تدريباً نهائياً

٥) أنا أستخدم الحاسوب عادة من أجل :

☐ العمل ☐ التسلية ☐ العمل والتسلية ☐ لاأستخدم الحاسوب نهائياً

٦) في المتوسط عدد الساعات التي أقضيها أسبوعياً في استخدام الحاسوب :

☐ لاأقضي أي وقت ☐ ١-٣ ساعة ☐ ٤-٦ ساعة
☐ أكثر من ٦ ساعات (من فضلك حدد) ....

٧) أستطيع استخدام التطبيقات التالية على الحاسوب :

☐ منسق الكلمات Word processing ☐ إدارة قاعدة البيانات Database Management
☐ حفظ السجلات Record keeping ☐ الجداول الرياضية Spreadsheet
☐ محاسبة Accounting ☐ البرمجة Programming
☐ الرسم Graphics ☐ البرامج التعليمية Instructional programs
☐ الناشر المكتبي Desk-top Publishing ☐ لاأستطيع استخدام أي من التطبيقات المذكورة أعلاه

٨) لو تم التدريب المقرر في الحاسوب في ثلاثة من التطبيقات المذكورة أعلاه فإنني أفضله أن يكون في (اختر ثلاثة ورتبهم حسب الأفضلية)

(١) .... (٢) .... (٣) ....

٩) أنا أفضل شكل مقرر الحاسوب العملي التالي :

☐ دورة قصيرة (من ٦-١٠ أسابيع) ☐ دورة اختيارية لمدة فصل دراسي
☐ دورة إجبارية لمدة فصل دراسي ☐ لاضرورة لوجود مقرر الحاسوب

١٠) أصف رغبتي بالتدريب على الحاسوب كالتالي :

☐ أخذت دروس على الحاسوب ولاأحتاج أي تدريب إضافي
☐ لي رغبة في أخذ دروس (أو زيادة دروس) عن الحاسوب
☐ ليس لي رغبة في أخذ دروس عن الحاسوب

١١) أغلب المعلومات التي أعرفها عن الحاسوب مصدرها :

☐ مقرر (مقررات) دراسي ☐ الزملاء في القسم
☐ الفيديو والتلفزيون ☐ مركز الحاسوب في الكلية
☐ الصحف ومجلات الحاسوب ☐ الكتب
☐ الأصدقاء
☐ غيره (رجاء التحديد) : ....

١٢) الحاسوب متوفر لاستخدامي :

☐ في الكلية ☐ في المنزل
☐ صديقي (قريبي) لديه حاسب ☐ غيره : (رجاء التحديد)
☐ الحاسوب غير متوفر لاستخدامي

الجزء الثالث : معلومات عن الحاسوب :

الرجاء وضع دائرة حول أفضل إجابة لكل عبارة من العبارات التالية :

١) الحاسوب ليس مهماً لأداء المهام التي تحتاج إلى :

أ- سرعة ب- دقة جـ- حدس د- تكرار هـ- لاأعرف

٢) العمل الأساسي لمبرمج الحاسوب هو :

أ- تشغيل الحاسوب ب- إعداد التعليمات للحاسوب جـ- تصميم الحاسوب
د- وضع جدول الأعمال للحاسوب هـ- لاأعرف

٣) تعني برامج الحاسوب (Computer Software) :

أ- التعليمات الموجودة على الأقراص الممغنطة
ب- الأجزاء الميكانيكية والإلكترونية من نظام الحاسوب
جـ- الأجزاء الإلكترونية المغطاة بلاستيك ناعم
د- الناس الذين يتعاملون مع الحاسوب
هـ- لاأعرف

The Students' Questionnaire Form
(Arabic version)

٤) تعرف أجزاء الحاسوب بأنها :
أ- البرمجة Programming ب- الجهاز Hardware جـ- البرنامج Software
د- كتب التعليمات Manuals هـ- لاأعرف

٥) برنامج الحاسوب هو :
أ- مقرر عن الحاسوب ب- مجموعة تعليمات للتحكم بالحاسوب
جـ- عرض مقدم بواسطة الحاسوب د- جزء من الحاسوب هـ- لاأعرف

٦) الحاسوب عندما يشتغل فإنه :
أ- يتبع مجموعة من التعليمات مكتوبة من إنسان ب- يفكر مثل الإنسان
جـ- يترجم المعلومات من أرقام إلى بيانات تناظرية د- يقرر ماذا يفعل بالمعلومات
هـ- لاأعرف

٧) يحتاج الحاسوب إلى نوعين من المعلومات لكي يحل مشكلة :
أ- المشكلة والحل ب- اسم البرنامج ورقم المستخدم
حـ- المعلومات والتعليمات د- اسم البرنامج واسم المستخدم هـ- لاأعرف

الجزء الرابع : الحاجة إلى التدريب على الحاسوب :

الرجاء تقدير حاجتك للتدريب على الحاسوب وذلك بوضع (✓) في المربع الذي يتناسب مع تقييمك لكل موضوع من الموضوعات التالية :	حاجة كبيرة ٤	بعض الحاجة ٣	ليس هناك حاجة ٢	لا أعرف إطلاقاً ١
١ التعرف على البرمجة بإحدى لغات الحاسوب				
٢ التعرف على ادخال وإخراج المعلومات من وإلى الحاسوب				
٣ التعرف على كيفية اختيار البرامج التعليمية للحاسوب				
٤ التعرف على تاريخ وتطور الحاسوب				
٥ التعرف على دور الحاسوب في المجتمع السعودي				
٦ التعرف على استخدام الحاسوب كوسيلة شيقة للتدريب والمران				
٧ التعرف على استخدام الحاسوب لتدريس حل المشكلات				
٨ التعرف على استخدام الحاسوب للمساعدة في أعمال الفصل الإدارية (مثل حفظ الملفات والدرجات)				
٩ التعرف على استخدام الحاسوب في تقويم قدرات الطلاب				
١٠ التعرف على استخدام الحاسوب في تشخيص احتياجات الطلاب				
١١ التعرف على استخدام الوسائط المتعددة في الحاسوب Multimedia				
١٢ التعرف على استخدام منسق الكلمات Word Processing				
١٣ التعرف على استخدام قاعدة البيانات Database				
١٤ التعرف على كيفية استخدام الجداول الرياضية Spreadsheet				
١٥ التعرف على كيفية استخدام الحاسوب في عرض المعلومات				
١٦ التعرف على كيفية الاستفادة من خدمات شبكة المعلومات Internet				

الجزء الخامس : الإتجاهات حول الحاسوب :

الرجاء وضع (✓) في المربع الذي يتناسب مع موقفك من كل عبارة من العبارات التالية :	أوافق تماماً ٤	أوافق ٣	لا أوافق ٢	لا أوافق تماماً ١	لا أستطيع الإجابة ٠
١ أرغب في أن أتعلم أكثر عن الحاسوب					
٢ أشعر بالتوتر عند استخدام الحاسوب					
٣ أجد متعة في قضاء الوقت عند استخدام برامج التسلية على الحاسوب					
٤ أشعر بالراحة عند التعامل مع الحاسوب في استخدام بطاقة الصراف					
٥ أرغب وبشدة في امتلاك حاسوب					
٦ أتطلع لأي دورات تقدم في الكلية عن استخدامات الحاسوب					
٧ أشعر بالارتباك عند التعامل مع المعدات الميكانيكية والإلكترونية					
٨ أود أن أستخدم الحاسوب في دراستي أو عملي					
٩ أشعر بمتعة عند العمل على الحاسوب					
١٠ العمل في غرفة مليئة بالحواسب يجعلني أشعر بالاضطراب					
١١ أشعر بالملل عندما أكون مع اناس يتحدثون عن الحاسوب					
١٢ أشعر بالثقة في قدرتي على استخدام الحاسوب					
١٣ بدأ الحاسوب في التحكم كثيراً في حياة الناس					
١٤ استخدام الحاسوب في المدارس عبارة عن موضة					
١٥ يجب أن يكون لدى أعضاء هيئة التدريس بكليات المعلمين معرفة في مجال الحاسوب وتطبيقاته					
١٦ يجب أن يكون لدى طلاب كليات المعلمين معرفة في مجال الحاسوب وتطبيقاته					
١٧ ينبغي استخدام الحاسوب في تعلم كثير من الموضوعات إلى جانب العلوم والرياضيات					

الجزء السادس : اقتراحات وملاحظات :

من فضلك يمكنك إضافة أي اقتراحات أو ملاحظات في الفراغ أدناه :

....

....

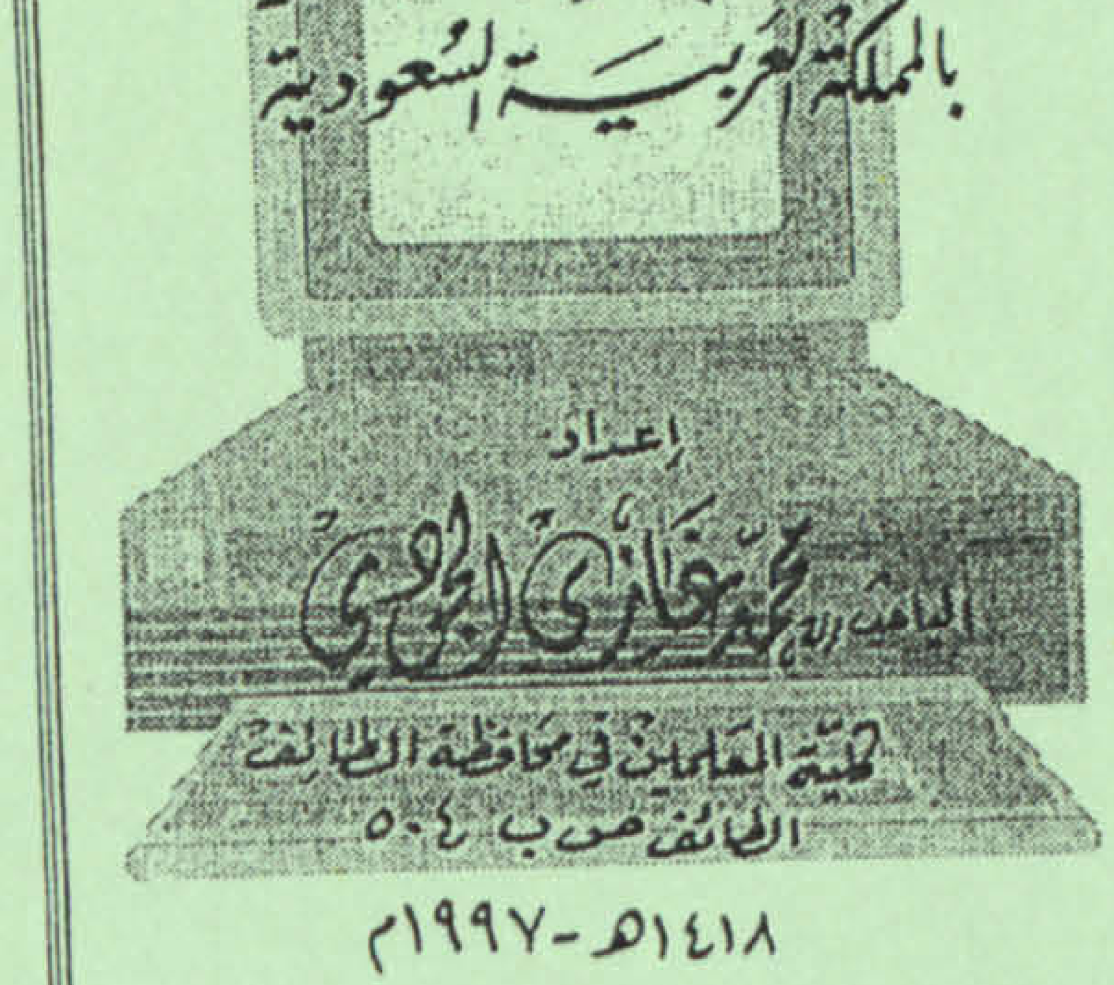
....

....

بسم الله الرحمن الرحيم

استبانة

الحاسوب وتقدير احتياجات التدريب واستقصاء الاتجاهات لدى طلاب كليات المعلمين بالمملكة العربية السعودية



إعداد

محمد غازي الجودي

الباحث ... كلية المعلمين في محافظة الطائف

الطائف ص ب ٥٠٤

١٤١٨هـ - ١٩٩٧م

نموذج (ب)

المكرم طالب الكلية

السلام عليكم ورحمة الله وبركاته ... وبعد

هذه الاستبانة جزء من دراسة الغرض منها هو تقويم وتقدير مدى احتياج طلاب كليات المعلمين في المملكة العربية السعودية إلى الإلمام بمبادىء تقنية المعلومات (الحاسوب) ، والتعرف على مواقفهم تجاه هذه التقنية ومعرفة مستوى معلوماتهم في هذا المجال ، لذا تجد أمامك أخي الطالب مجموعة من الأسئلة والاستفسارات ، آمل منكم التكرم بالإجابة عليها في حدود معلوماتك في هذا المجال ، مع تحري الصحة والدقة ، والإجابة التي تشعر بها حقيقة هي الإجابة المفيدة . لذلك ، من فضلك اكتب فقط الإجابة التي تمثل رأيك الخاص ، كما أرجوا التكرم بالإجابة على جميع أسئلة الاستبانة .

جميع البيانات التي تعطيها سأحتفظ بها شخصياً في سرية ، ولن يطلع عليها أي شخص آخر ، وإذا أردت عدم ذكر اسمك فيمكنك ذلك .

ولك مني الشكر والامتنان على حسن تعاونك .

أخوك

الباحث : محمد غازي الجودي

كلية المعلمين بالطائف

الطائف - ص.ب : ٥٠٤

الجزء الأول : معلومات عامة : ضع علامة (✓) لتصف نفسك عند كل فقرة من الفقرات التالية :

١) الاسم (اختياري) .... الكلية ....

٣) المستوى الدراسي : ☐ الأول ☐ الثاني ☐ الثالث ☑ الرابع

٤) القسم ☐ دراسة قرآنية ☐ دراسات إسلامية ☐ لغة عربية ☐ اجتماعيات ☐ تربية رياضية ☐ رياضيات ☐ علوم ☐ تربية فنية ☐ حاسب آلي

٥) العمر : ☐ ١٧-٢٠ ☐ ٢١-٢٤ ☐ أكثر من ٢٤ (حدد من فضلك) ....

٦) المؤهل الدراسي : ☐ ثانوي علمي ☐ ثانوي أدبي ☐ معهد علمي أو مايعادله ☐ معهد معلمين أو مايعادله

الجزء الثاني : الخبرة في مجال الحاسوب :

ضع علامة (✓) على الإجابة التي تتمشى مع خبراتك السابقة في مجال الحاسوب :

١) لدي خبرة في أحد أجهزة الحاسوب التالية :

☐ الحاسوب الصغير (الشخصي الخاص والذي لايعمل ضمن شبكة Microcomputer)

☐ الحاسوب متوسط الحجم (الشخصي الذي يعمل مستقل ويمكن أن يكون ضمن شبكة محلية Minicomputer)

☐ الحاسوب الكبير (المكون من وحدة رئيسة وعدد من المخارج كالموجود في الجامعات Main Frame Computer)

☐ ليس لدي خبرة على الإطلاق

٢) استطيع استخدام لغة (لغات) الحاسوب التالية :

☐ لغة البيسك BASIC ☐ لغة لوغو LOGO

☐ لغة باسكال PASCAL ☐ لغة الكوبول COBOL

☐ لغة الفورتران FORTRAN ☐ أخرى (حدد من فضلك) ....

☐ لاشيء مماذكر أعلاه

٣) تدريبي على الحاسوب شمل :

☐ ورشة معملية (فترة تدريب عملي قصيرة لعدد من الأيام Workshop)

☐ فترة تدريب قصيرة أكثر من شهر (Short training)

☐ مقرر (مقررات) لمدة فصل دراسي كامل أو أكثر (Full course(s))

☐ غيرها رجاء التحديد : ....

☐ أنا لم ألتحق بأي دورة على الحاسوب

٤) تلقيت تدريبي على الحاسوب في :

☐ المدرسة الثانوية ☐ الجامعة ☐ الكلية

☐ معهد خاص ☐ بالتدريب الذاتي ☐ لم أتلق تدريباً نهائياً

٥) أنا أستخدم الحاسوب عادة من أجل :

☐ العمل ☐ التسلية ☐ العمل والتسلية ☐ لاأستخدم الحاسوب نهائياً

٦) في المتوسط عدد الساعات التي أقضيها أسبوعياً في استخدام الحاسوب :

☐ لاأقضي أي وقت ☐ ١-٣ ساعة ☐ ٤-٦ ساعة

☐ أكثر من ٦ ساعات (من فضلك حدد) ....

٧) أستطيع استخدام التطبيقات التالية على الحاسوب :

☐ منسق الكلمات Word processing ☐ إدارة قاعدة البيانات Database Management

☐ حفظ السجلات Record keeping ☐ الجداول الرياضية Spreadsheet

☐ محاسبة Accounting ☐ البرمجة Programming

☐ الرسم Graphics ☐ البرامج التعليمية Instructional programs

☐ الناشر المكتبي Desk-top Publishing ☐ لاأستطيع استخدام أي من التطبيقات المذكورة أعلاه

٨) لو تم التدريب لمقرر في الحاسوب في ثلاثة من التطبيقات المذكورة أعلاه فإنني أفضله أن يكون في (اختر ثلاثة ورتبهم حسب الأفضلية)

(١) (٢) (٣)

٩) أنا أفضل شكل مقرر الحاسوب العملي التالي :

☐ دورة قصيرة (من ٦-١٠ أسابيع) ☐ دورة اختيارية لمدة فصل دراسي

☐ دورة إجبارية لمدة فصل دراسي ☐ لاضرورة لوجود مقرر الحاسوب

١٠) أصف رغبتي بالتدريب على الحاسوب كالتالي :

☐ أخذت دروس على الحاسوب ولاأحتاج أي تدريب إضافي

☐ لي رغبة في أخذ دروس (أو زيادة دروس) عن الحاسوب

☐ ليس لي رغبة في أخذ دروس عن الحاسوب

١١) أغلب المعلومات التي أعرفها عن الحاسوب مصدرها :

☐ مقرر (مقررات) دراسي ☐ الزملاء في القسم

☐ الفيديو والتليفزيون ☐ مركز الحاسوب في الكلية

☐ الصحف ومجلات الحاسوب ☐ الكتب

☐ الأصدقاء

☐ غيره (رجاء التحديد) : ....

١٢) الحاسوب متوفر لاستخدامي :

☐ في الكلية ☐ في المنزل

☐ صديقي (قريبي) لديه حاسب ☐ غيره : (رجاء التحديد)

☐ الحاسوب غير متوفر لاستخدامي

الجزء الثالث : معلومات عن الحاسوب :

الرجاء وضع دائرة حول أفضل إجابة لكل عبارة من العبارات التالية :

١) الحاسوب ليس مهماً لأداء المهام التي تحتاج إلى :

أ- سرعة ب- دقة جـ- حدس د- تكرار هـ- لاأعرف

٢) العمل الأساسي لمبرمج الحاسوب هو :

أ- تشغيل الحاسوب ب- إعداد التعليمات للحاسوب جـ- تصميم الحاسوب د- وضع جدول الأعمال للحاسوب هـ- لاأعرف

٣) تعني برامج الحاسوب (Computer Software) :

أ- التعليمات الموجودة على الأقراص المغناطيسية

ب- الأجزاء الميكانيكية والإلكترونية من نظام الحاسوب

جـ- الأجزاء الإلكترونية المغطاة بلاستيك ناعم

د- الناس الذين يتعاملون مع الحاسوب

هـ- لاأعرف

The letter of approval for the questionnaires' translation

KINGDOM OF SAUDI ARABIA MINISTRY OF HIGHER EDUCACTION UMM AL-QURA UNIVERSITY TAIF FACULTY OF EDUCATION DEPARTMENT OF FOREIGN LANGUAGES	بسم الله الرحمن الرحيم	المملكة العربية السعودية وزارة التعليم العالي جامعة أم القرى الطائف كلية التربية قسم اللغات الاجنبية

TO WHOM IT MAY CONCERN

I have checked and revised the Arabic translation of two types of questionnaires done by Mr.Mohammed G. Al-Joudi as part of his research work. I have compared the Arabic translation with the English version. The two forms were found identical.

The ideas are put in simple straightforward language. I am quite sure that the final versions that I have seen do not contain ambiguous expressions, nor do they cause confusion or misunderstanding of ideas to any native Arabic reader.

Chairman:

Dr. Adil A. M. Al-Sulaimani

DEPARTMENT OF FOREIGN LANGUAGES
TAIF COLLEGE OF EDUCATION

Appendix (B)

The key questions for interview with officials and Computer course teachers

1) **The Decision-makers:**

Q1: What computer courses were formerly provided in Teacher Colleges?

Q2: Who benefited from these courses?

Q3: What are your feelings about these courses?

Q4: What are the reasons behind introducing the new computer course for college students in all departments?

Q5: Do students in Teacher College need to learn about computers?

Q6: What do you think is their attitude to computers?

Q7: What is the level of hardware, software and human resources to meet the introduction of the new computer course?

Q8: Do you think Teacher Colleges will meet any obstacles to the introduction of the computer course? If so what are they?

Q9: What about the teaching staff in Teacher College? Are they familiar with computers?

Q10: Do they use computers in their teaching?

Q11: Do you think teacher staff in Teacher Colleges need to learn about computers?

Q12: What is your impression about the teaching staffs' attitude toward learning about computers?

Q13: Do you have any policy for the teaching staff to be computer trained and do you have any plan to promote their computer awareness?

Q14: Are there proposed computer training activities, and if there are, who administer these activities and who benefit from them?

Q15: Would you like to add any suggestions or comments about this topic?

2) Educational District Director and Computer Supervisor:

Q1: Are computers available in the primary schools, and if so, who use them, and what for?

Q2: From your observation and visits to the primary schools, what do you think is the attitude of primary school teachers toward computers?

Q3: What type of computer training activities do the educational district offer for the primary school teachers?

Q4: Do primary school teachers need computer training? If so, what skills do you think they need to acquire?

Q5: What computer courses are available in secondary schools and how many hours do students study computers weekly?

Q6: Why do think it is that some students, after graduating from secondary school, claim to have little or no computer experience?

Q7: What do you think of the idea of training Teacher College teaching staff and students in the use of computers?

Q8: Would you like to add any comment or suggestion?

3) Computer Course Teachers in Teacher Colleges:

General Information: Name:---------------- Teacher College: --------------
Nationality: ---------------------- Qualification: ----------------------
Department: ---------------------- Years of experience: -------------
Specialization: -------------

If not in Computer Studies, what type of computer training have you had? Would you explain?

Q1: What is your opinion of the computer courses currently offered to Mathematics and Science students?

Q2: How appropriate are those courses to students' future needs?

Q3: What do you think is students' attitude towards computers?

Q4: Can you comment on the computer equipment and staff availability in the Teacher College where you work? Are they adequate?

Q5: What do you think about the proposal to introduce a compulsory computer course for all Teacher College students?

Q6: Do Teacher College teaching staff need computer training?

Q7: Does the Teacher College where you work offer such training for teaching staff? If so, what kind?

Q8: Do you have other comments or suggestions?