INFORMATION TO USERS

While the most advanced technology has been used to photograph and reproduce this manuscript, the quality of the reproduction is heavily dependent upon the quality of the material submitted. For example:

- Manuscript pages may have indistinct print. In such cases, the best available copy has been filmed.
- Manuscripts may not always be complete. In such cases, a note will indicate that it is not possible to obtain missing pages.
- Copyrighted material may have been removed from the manuscript. In such cases, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, and charts) are photographed by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each oversize page is also filmed as one exposure and is available, for an additional charge, as a standard 35mm slide or as a 17"x 23" black and white photographic print.

Most photographs reproduce acceptably on positive microfilm or microfiche but lack the clarity on xerographic copies made from the microfilm. For an additional charge, 35mm slides of 6"x 9" black and white photographic prints are available for any photographs or illustrations that cannot be reproduced satisfactorily by xerography.

Order Number 8719618

Toward computing in Algerian higher education: Assessment, perceptions and alternatives

Meziane, Mohammed, Ed.D.

United States International University, 1987

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

PLEASE NOTE:

In all cases this material has been filmed in the best possible way from the available copy. Problems encountered with this document have been identified here with a check mark __✓__.

1. Glossy photographs or pages _____
2. Colored illustrations, paper or print _____
3. Photographs with dark background _____
4. Illustrations are poor copy _____
5. Pages with black marks, not original copy _____
6. Print shows through as there is text on both sides of page _____
7. Indistinct, broken or small print on several pages _____
8. Print exceeds margin requirements _____
9. Tightly bound copy with print lost in spine _____
10. Computer printout pages with indistinct print _____
11. Page(s) _____ lacking when material received, and not available from school or author.
12. Page(s) _____ seem to be missing in numbering only as text follows.
13. Two pages numbered _____. Text follows.
14. Curling and wrinkled pages _____
15. Dissertation contains pages with print at a slant, filmed as received _____
16. Other **SOME PAGES CONTAIN CORRECTION FLUID.

FILMED AS RECIEVED.

University Microfilms International

TOWARD COMPUTING IN ALGERIAN HIGHER EDUCATION: ASSESSMENT, PERCEPTIONS AND ALTERNATIVES

A Dissertation

Presented to the

Graduate Faculty of the

School of Education

United States International University

In Partial Fulfillment

of the Requirements for the degree of

Doctor of Education

By

Mohammed Meziane

San Diego, 1986

TOWARD COMPUTING IN ALGERIAN HIGHER EDUCATION: ASSESSMENT, PERCEPTIONS AND ALTERNATIVES

A Dissertation

Presented to the

Graduate Faculty of the

School of Education

United States International University

---

by

Mohammed Meziane

Approved by:

Colin Mackinnon, Chairperson — Date: 5/19/87

Dale Hamreus

Gerald Rosander, Dean

Arthur Gumbrell

ACKNOWLEDGEMENTS

It is a pleasure to express my sincere appreciation to all the people who participated in this study: friends, colleagues, instructors and administrators.

Particular thanks is tendered to my family for their support and patience during this research which was tempered by experiences of frustration and joy.

Special appreciation goes to Dr. Mackinnon, the chairman of my committee, for his assistance and support. Many thanks also to Dr. Gumbrell for his services as a member of my committee. A sincere recognition to Dr. Hamreus, whose assistance and encouragement have been always present when needed.

Finally, this research would not have been possible without the scholarship granted to me by the Algerian Ministry of Higher Education.

TABLE OF CONTENTS

Page

LIST OF TABLES IX

Chapter

1. INTRODUCTION 1

Background of the Problem 2

Statement of the Problem 5

Purpose of the Study 8

Rationale of the Study 9

Theoretical Framework 10

Importance of the Study 19

Scope of the Study 20

Research Hypothesis 20

Research Questions 21

Definition of Terms 22

2. REVIEW OF THE LITERATURE 25

Introduction 25

Computer Technology 25

The Transfer of Computer Technology to Developing Countries 27

Computers in Higher Education 34

Computing in Higher Education 36

Human Resources and Computing in Higher Education 45

Computer Attitudes 48

Introduction to Algeria 51
Informatics in Algeria 54
Informatics in Algerian Higher Education 58
The Future of Informatics in Algerian Higher Education 61
Some of the Organizational Aspects of Algerian Universities 64
3. METHODS AND PROCEDURES 70
Introduction 70
Research Design 70
Source of Data 73
Instrumentation 74
Description of the Questionnaire 75
Procedures 77
Analysis of Data 78
4. FINDING 80
Section One 80
Desription of the Sample 80
Computer Awareness 85
Computer Interest 87
Perception of Computer Utilization 89
Hypothesis One 92
Hypothesis Two 99
Hypothesis Three 101

Hypothesis Four 106
Hypothesis Five 110
Hypothesis Six 109
The Perceived Impact of Computers 113
Additional Findings 114
Section Two 119
Identification of Administrative Problems 119
Problems of Student Enrollment 120
Personnel Administrative Problems 123
Computer Capability 124
Computing at the University of Oran 125
Computer Human Resources at the University of Oran 128
The Algerian Computing Profile 129
5. SUMMARY, CONCLUSIONS, DISCUSSION AND RECOMMENDATIONS 134
Summary 134
Conclusion 141
Discussion 141
Recommendations 147
REFERENCES 150
APPENDICES 157
A. PERCEPTION SURVEY (ENGLISH VERSION).
B. PERCEPTION SURVEY (FRENCH VERSION).

C. PERCEPTION SURVEY (ARABIC VERSION).

D. PERCEPTION OF THE RESPONDENTS TOWARD COMPUTER UTILIZATION.

E. ESTIMATED NUMBER OF STUDENTS IN COMPUTER SCIENCE: (1985-1989).

LIST OF TABLES

Table — Page

1. Number of Computers Operating in Algeria 56
2. Distribution of Computers in Algeria 60
3. Number of the Algerian Graduates in Informatics 60
4. Number and Percentage of Respondents by Occupation 81
5. Number and Percentage of Respondents by Educational Levels 82
6. Number and Percentage of Respondents by Fields 83
7. Number and Percentage of Teachers by Positions 84
8. Number and Percentage of Respondents by Type of Schools 85
9. Number and Percentage of the Extent of Computer Awareness of Respondents 86
10. Number and Percentage of the Extent of Computer Interest of Respondents 88
11. Perception of Respondents toward Computer Utilization 91
12. Differences in the Perception between Administrators and Instructors toward Computer Utilization 93
13. Difference between Administrators and Instructors' Reations to the Statement "Computer Utilization Is Important but It Is Not the Right Time to Think About It" 95
14. Difference between Administrators and Instructors' Reactions to the Statement "Computers Contribute in the Improvement of the Management of the University" 96
15. Difference between Administrators and Instructors' Reactions to the Statement "Computer Does Not Offer Any Advantage for the University" 97

16. Difference between Administartors and Instructors' Reactions to the Statement "The Problems of the Management of the University Do Not Have Anything to Do with Computers" 98

17. Difference between Instructors' Reaction towards the statement "The Use of Computers Requires a Systematic Reorganization of the University" 99

18. Difference in the Perception of Respondents by Type of Fields toward Computer Utilization (Hmanities and Social Sciences versus Hard Sciences) 100

19. Difference in the Perception of Respondents toward Computer Utilization by Level of Education 101

20. Difference in the Perception of Respondents by Levels of Education with respect the Statement "Computer is a Luxury for our Society" 103

21. Difference in the Perception of Responents by Educational Level with respect to the statement" The Computer is Important, but it is not the Right Time to Think about It".. 104

22. Difference in the Perception of Respondents by Levels of Education with respect to the Statement "Computer does Not Offer any Advantage to our University" 105

23. Difference in the Perception of Respondents by Levels of Education with respect to the Statement "The Use of Computers Requires a Systematic Reorganization of the University" 106

24. Differences in the Perception of Respondents toward Computer Utilization by National Schools and Foreign Schools 107

25. Difference in the Perception between Instructors from Humanities and Social Sciences versus Instructors from Exact Sciences regarding the Statement "Computer is Important, but it is not the Right Time to Think about It" 108

26. Differences in the Perception between Those Experienced Respondents in Computers and Those not Experienced 110

27. Differences in the Perception between Those Interested Respondents in Computer and Those Not Interested 111

28. Difference in the Percetion of the Respondents toward the Utilization of Computer by Administrators Positions 115

29. Difference in the Perception of Respondents toward the Utilization of Computer in the University by Instructors Positions 117

Chapter One

INTRODUCTION

Although there are many causes which explain the existing gap between the performance of organizations in the advanced nations and those of the developing nations, technology certainly stands as a major discriminatory factor. The application of continuing innovative technology has proven its impact on performance. The contribution of technology is thus a major element in national development. However, the debate is still taking place about what constitutes appropriate technology for the less developed countries and how the transfer of technology should be processed.

Computers are the new promising machines that are used in many aspects of the western economic and social life, and education has taken advantage of the successful computer applications in business to improve its performance, and the quality of its services.

While less developed countries have not been able to digest the industrial technology, they are driven to deal with more complex technology, that is, of microelectronics or high technology (King, 1982). Along these lines, higher education in the emerging countries has a cumbersome task to play in the transfer of knowledge and innovative technology. Contemporary higher institutions cannot fulfill their basic

basic objectives if they are still functioning with overwhelming difficulties. The world has come, more than ever, to recognize that the computer can be a useful tool for administration management and information processing. Computers can be used in a variety of ways and in different fields, and by the time this work is completed, numerous further improvements and new applications are likely to have been developed and applied.

In spite of the difficulties encountered by developing countries in terms of their attempts to satisfy the urgent basic needs such as food, shelter, health and education, and in spite of their limitations in dealing with high technology, it appears that a large number of such countries have manifested a growing attention to, and demand for, computer use. To deal with this challenging task, developing countries, among them Algeria, have initiated a national policy in informatics.

Background of the Problem

Algeria, located in northwestern of Africa, was a French colony for more than a century. Its independence was achieved in 1962. Five years later, two important institutions were created in order to reinforce and organize informatics throughout the country: The Informatic National Office (Commissariat National a l'Informatique), and the

Informatics Research and Education Center (Centre d'Etude et de Recherche en Informatique).

The use of computers in Algeria is regarded as a means to accelerate the process of economic development, that is, by improving the management of the economy in the assignment and use of national resources. Computers are also seen as an important tool for better management of the public corporations and for administration (Bouras, 1974).

In 1972, sixty-nine computers were operating in the country. Most of them were being used in the capital city of Algiers. At that time the University of California in the U.S.A alone was using over two hundred computers. It is worth mentioning that among the 184 computers installed by the year of 1981 throughout the country, 13 computers were assembled in the country. These steps in computer industry allowed a full control of installation and maintenance by the native personnel. The Algerian approach, regarding the adoption of computers, was cautious of falling into a premature decision. A general manager of the Informatics Research and Study Center underlined this attitude saying:

> We don't want to fall into the snare of the computer myth, neither to be the victims of an imported model, since the development of informatics is not based on the installed number of computers (Bouras, 1974:538).

Algeria does not have exposure to high technology, due to the short history of its industrialization. Some

sophisticated technologies were, however, installed in heavy industry, mostly in the oil and gas industry.

The impressive trends of transferring computer technology and computer applications require highly trained manpower. Computer training in Algeria is managed through universities and the Informatics Research and Study Center. One of the problems that face educational institutions is the lack of educational facilities to train and assist students of computer science in their training. The flow of computers to Algeria is very slow. Chaouch (1984:24), excited by different experiences in developing countries, expressed the state of informatics in Algeria as "taboo."

The rapid growth in the size and activities of the Algerian higher education system, along with increasing demands from a variety of economic sectors, have shown the need to improve the management efficiency of institutions. Higher education institutions have been asked to assimilate and use the computer potential in order to train the students and personnel needed, but difficulties have been manifested in handling and managing the growing number of students. It is expected, however, that the universities will contribute to research development and participate in solving other problems of the Algerian community, and keep pace with the demand of the society. One can assume that before the materialization of this premise, universities must begin handling and solving their own internal problems.

Educational institutions, on the other hand, are facing many administrative and instructional problems. The need to solve these difficulties is very urgent, in order to improve the management of the university activities and to develop a sense of commitment to the real issues of teaching quality and research. The computer can be a friendly tool, but not a panacea to solve all the problems. Computers can be used to assist administrators and faculty members to control local problems, and also to promote computer utilization to meet their practical needs. The opportunities to use the available potential of computer technology is one of the most exciting challenges to education in developing countries.

There is a need to identify those problems which can be solved or improved by computer assistance. Faculty members and administrators, being the concerned parties, are in the best positions to bring about the changes. Therefore, the need to identify their perceptions toward computers and their level of readness is crutial to understand the state of computing in Algerian educational institutions.

Statement of the Problem

In Algeria the access to any equipment related to computers, including microcomputers, must go through the monopoly of a public corporation. The exposure to computers is limited.

Algerian students, as well as most of faculty members, lack the opportunity to be informed and trained about the use of computers in their corresponding disciplines.

Management of the universities is systematically operated through the traditional paperwork processing. The lack of training and awareness programs in the universities, in addition to the non-existance of appropriate hardware facilities, could be a barrier to improve the promotion of computer utilization.

The activities of Algerian universities are rapidly increasing, because of the high number of students, teachers, and staff, and also due to the instructional tasks and to research. Moreover, some of the institutes are segmented into new institutes which means more clerical workers, more floor space, and more paper work.

The Algerian Ministry of Higher Education, aware of the growth and complexity, and volume, of the universities, quoted the introduction of computers in administrative management of the universities as a necessity (Ministry of the Algerian Higher Education, 1984). This announcement was at the root of the motive to investigate the problems which can be alleviated by computer assistance.

As a faculty member, this researcher had the opportunity to experience many of the managerial problems that affected the regular student enrollment, and the teaching quality. For example, the full semester is

formally scheduled to start by mid-September, but almost always is delayed until mid-November, with approximately half of the study period wasted. One reason for this problem is that the timetables assigning classrooms to different classes and disciplines is not always ready at the beginning of the semester; and if they are ready, difficulties arise in terms of classrooms overlapping, or lack of fair distribution between evening and morning classes, which disappoint many students, as well as faculty members.

The limited number of available classrooms, laboratories, and lecture halls, and the large number of enrolled students, add a heavy burden for faculty members and administrators who handle class scheduling. At the same time, each institute has, besides the offices of deans, heads of departments and their secretaries, its own administration, which handles student files and registration. Each institute tends also to be autonomous and monitors its own facilities such as copy center and library. This means that due to the segmentation and the autonomy, each institute is considered almost as a university of its own. This creates increasing needs in terms of clerical workers, floor space and paper work. This example is one of the many other existing problems, such as students' data file keeping, students' grades processing, to name a two.

One way to solve these kinds of problems is to search for alternatives. The computer can be of assistance if appropriately adopted. This study was aimed at determining the university problems that can be assisted by computers and at investigating the extent of faculty and staff readiness toward the use of computers.

It is of importance to identify the stages of computing development so as to understand the overall context of what is being done, and thereby identify the areas in need of urgent improvements.

Purpose of the Study

This study investigated the state of informatics or computer utilization in Algeria, and identified the development profile of computing at the Algerian higher education level.

It was thus the concern of this research to :

1. Determine the state of the computer readiness of faculty members and administrators (computer awareness, computer interest, computer attitudes).

2. Identify the administrative problems which face the university.

3. Assess the existing capabilities of Algerian university in terms of:

   a) Computer capability.

b) Computer utilization.

c) Human resources in computers.

Rationale of the Study

Many administrative tasks that, in the past, were considered as tedious and difficult, are today easily done. Without doubt, the computer is the major tool in alleviating the repetitive difficulties encountered by Western universities. Data processing, based on computer technique, has been successful in such universities. Today it is impossible to find a modern and respected university not involving computers in educational or administrative activities.

Universities in Algeria are expected to contribute to the process of development by offering a good education and successful research. To solve the many problems of the economy, and the society as a whole, the university stands thus as the primary safeguard, because the quality of education is the key to a high standard of living. This study has addressed the issue of computing in Algerian universities, because it represented the one environment which may provide the best available expertise and knowledge resources in the country. However, the institutions of Algerian higher education are still perplexed, and cannot solve even their own internal problems. Morever, the university has to ensure a good quality of education and to

keep pace with contemporary universities. The versatility of computer uses regarding this aspect was assumed to help the university to achieve its goals.

Theoretical Framework

It appears from the review of the literature that there is no single and best model to implement computing in colleges and universities. Each institution has been taking a different approach, according to its perceived needs and capabilities. Selection of a specific strategy depended on the extent of computing activity at the institution, and on its stage of computing.

Fullan (1982) suggested a three phase model of computing. This involves a) initiation, which is also called mobilization or adoption, b) implementattion or initial use and c) continualization, which is also referred to as incorporation, routinization or institutionalization. The phases model is qualified to be nonlinear, and its scope and time is open.

The model selected for this study springs from the growth cycle or the stage development model (Robbins, et al., 1975). It is a four-level sequential classification scheme which categorizes the development of computing in higher education, and encompasses four elements that can change through four stages. The four elements are:

a) Technological capability .

b) Attitude of administration.

c) Extent of computing.

d) Availability of professional computer staff.

The model of stage development identifies the characteristics of each element across the four stages. These stages are the initial stage, the basic stage, the operational stage and the extended stage. The characteristics of each stage are as follows:

Initial Stage of Development

The characteristics of the initial stage are presented as follows:

__ Top administration believes there is little use for computing, or that the costs are too high to justify the use of a computer.

__ Top administration has little or no perception of the potential impact of computing on the institution.

__ The extent of knowledge, experience, and understanding of computing among individuals at the institution is very low or nonexistent.

__ A few individuals in the institution have had contact with computing, but there are generally no computer-oriented faculty and staff in academic or administrative departments.

__ Information about computing is generally available only from outside the institution, such as from computer sales people or consultants.

__ Education and training in computing are generally not available at the institution.

__ There are no operational computers in the institution and generally no access to computing outside the institution.

__ There is little or no use of computing in an academic institution.

__ There is little or no use of computing in research.

__ There is little or no use of computing in administrative operations.

__ There is no professional computer staff at the institution.

__ There are no discipline-oriented computer specialists in academic or administrative departments.

__ There is no organization of professional computer staff.

__ There is no operating control over computing at the institution.

__ Hardware development and modification are not carried out.

__ Software development in support of academic or administrative operations is not carried out.

Basic Stage of Development

The characteristics of the basic stage are presented as follows:

__ Top administration recognizes some applications of computing, primarily in administrative operations.

__ Top aministration has some limited perception of the potential impact of computing on the institution.

__ There is some understanding of computing among faculty and administration at the institution. Student understanding of computing is generally low.

__ Several individuals in the institution have had contact and experience with computing, and computer-oriented faculty and staff are found in one or two academic or administrative departments.

__ Limited information about computing is available from a few individuals at the institution.

__ There is some education and training in computing available at the institution.

__ The institution has access to computing, but may or may not have an operational computer on the campus.

__ There is limited use of computing in academic instruction, usually in only a few disciplines.

__ There is limited use of computing in research, usually in only a few disciplines

__ Computers are used to carry out a few basic administrative operations.

__ One or two individuals serve as professional computer staff on a part-time or full-time basis.

__ Discipline-oriented computer specialists are found in one or two academic and administrative departments.

__ Professional computer staff is usually organized as part of an existing academic or administrative department. There is little or no participation by users in decision-making.

__ Hardware development is carried out on a very limited basis.

__ Software development in support of academic and administrative operations is carried out on a very limited basis.

Operational Stage of Development

The characteristics of the operational stage are presented as follows:

__ Top administration recognizes many applications of computing in instruction, research, and administration.

__ Top administration has a good perception of the potential impact of computing on the institution.

__ There is a good understanding of computing in several academic and administrative departments. Student understanding of computing is increasing rapidly.

__ Numerous individuals at the institution have had experience with computing, and computer-oriented faculty and staff are found in several academic and administrative departments.

__ Information about computing is available from internal sources, including professional computer staff and computer-oriented faculty and administration.

__ Education and training in computing are rapidly available at the institution.

__ There are one or more major computer systems operating at the institution, particularly the mathematical, physical, and social sciences, engineering and business.

__ Computing use is affecting research in many disciplines.

__ The computer is used extensively for administrative operations.

__ A modest staff of professional computer specialists serves the institution.

__ Discipline-oriented computer specialists are found in several academic departments or centers, independent of existing academic and administrative departments. They may or may not be a separate academic department of computer science.

__ Computer professional staff is usually organized into one or two departments or centers, independent of existing academic and administrative departments.

__ Operating control over computing is usually vested in one or two independent centers, headed by professional computer managers. Varying degrees of user participation in decision-making exist.

__ Hardware development and modification are carried out on a selected basis.

__ Software development in support of academic administrative operations is carried out on a selected basis.

Extended Stage Development

The characteristics of the extended stage are as follows:

__ Top administration recognizes the widespread applicability of computing to almost all operations at the institution, and actively encourages such applications.

__ Top administration has a broad perception of the impact of computing on the institution.

__ There is widespread understanding among the faculty and administration. Student understanding is extensive.

__ Large segments of the faculty and staff have had experience with computing, and computer-oriented faculty and staff are found in almost all academic and administrative departments.

__ Information about computing is rapidly available from individuals throughout the institution.

__ There is a complete range of quality education and training in computing available at the institution, including degree programs in computer or information science.

__ The number of computers at the institution, of all sizes and types, is increasing rapidly. Time sharing, teleprocessing, and remote job entry are common. Extensive use is made of specialized computer systems, operating inside and ouside the institute: interinstitutional networking is prevalent and computer graghics exists.

__ There is a widespread and well-established use of computing in academic instruction in almost all disciplines, and new computer applications are found regularly.

__ Most administrative operations are carried out on computers and administrative information systems are in use or under development.

__ A large and diverse staff of professional computer specialists serves the institution, including operators, programmers, administrators, and engineers.

__ Discipline-oriented computer specialists are found in almost all academic and administrative departments, and are funded as such. There is also an academic department of computer science.

__ Professional computer staff is organized into several independent specialized departments or centers.

__ Operating control over computing is usually decentralized. Centralization of control is underway

through development of new positions in top administration. user participation in decision-making is general practice.

__ Extensive hardware development and modification are occurring.

__ Extensive software development in support of academic and administrative operations is occurring.

__ Operating control over computing is usually vested in one or two independent centers.

This model was considered as a framework for this study to describe the four elements as they exist in Algerian higher education, in order to understand the actual state of the development of informatics.

Importance of the Study

From the growing evidence coming from the enormous applications of computer technology in assisting development, many scholars urged developing countries to react quickly to adopt a national policy in informatics, particularly in the domain of education.

This research is seen as a contribution to better understanding of the state of informatics in Algeria, and it highlights the factors that can facilitate further development of computing in the administration, research and instruction in Algerian universities. Research and studies

in computer use in Algeria are very limited and it seems that there is an urgent need to launch interest in this important field.

This study provides information regarding a) the current problems of the Algerian administration in higher education and b) the description of the important factors of computing development. It is also hoped to open a new debate and interest about the methods of improving computer appreciation in the university community.

Scope of the Study

This study dealt primarily with the experience of Algeria in informatics. For practical methodological reasons the survey was limited to the use of computers at universities. The survey was conducted at the University of Oran, which is located in the western part of Algeria. This study was not aimed at bringing about a complete answer to the implementation of computer assisted administration in Algerian universities, but its results were expected to contribute to a better understanding of the actual situation as a basis for further technical applications.

Research Hypotheses

This study addressed the following hypotheses relative to Algerian universities:

H 1. Administrators perceive computer utilization in

university affairs more favorably than do instructors.

H 2. Instructors from the field of Hard Sciences are more favorable to computer utilization than instructors from Humanities and Social Sciences.

H 3. Administrators and instructors with higher educational levels perceive computer utilization more favorably than those with lower educational levels.

H 4. Faculty members and administrators who graduated from local institutions perceive computer utilization less favorably than those who graduated from foreign universities.

H 5. Faculty members and administrators with experience in computers perceive computer utilization more favorably than those with no experience.

H 6 Administrators and instructors who demonstrate a willingness to learn about computer perceive computer utilization more favorably than those who do not.

Research Questions

In addition to the above hypotheses, and in order to identify and understand the state of computing in Algerian

higher education, and also to assess the needs for computing, the following research questions were addressed and investigated:

1. What administrative problems is the Algerian university system currently facing?

2. What is the nature of computer interest among faculty members and administrators?

3. What is the nature of attitudes of faculty members and administrators toward the computer and its use to solve the managerial problems of the university?

4. To what extent are faculty members and administrators interested in learning about computers?

5. What are the current capabilities of the University of Oran in terms of hardware and equipment facilities?

6. What are the current available human resources in computer education?

7. What are the current uses of computing in the University of Oran?

Definition of Terms

Informatics: Informatics is used to express, in its widest context, the new scientific, technological and engineering disciplines related to computers; and its widest

social, economic and cultural aspects. Informatics is a much broader concept than computer science, which is restricted to technical aspects (Parker, 1978:11).

Computer Awareness: Computer awareness is the familiarity with the machine. It involves an understanding of how the machine works, what are its uses in solving problems and what is its role in the activities of educational institutions, and in the society in general.

Administrators: Those people who have administrative and pedagogical responsibilities. They are acquainted with the Ministry of Higher Education, through the president of the university.

University Centers: University centers are educational institutions of higher education. They usually have a few specialized institutes.

Computing Center: (Centre de calcul) Consists of main computers at Algerian universities. Its purpose is to offer computing assistance at university.

Informatics Laboratory: A computer room which usually consists of a few microcomputers for computer training.

University: This refers to an institution that provides formal education beyond the post-secondary level. Admission generally requires a "baccalaureat" or equivalant degree.

Computerization: Computerization is adapting a function so that it is accomplished through the utilization of an electronic computer.

Exact Sciences : Exact Sciences known as Hard Sciences includes disciplines like Physics, Mathematics, Chemistry, Computer Science, Engineering and related fields.

Chapter Two

REVIEW OF THE LITERATURE

Introduction

This chapter is divided into three general sections. The first section provides information about computer technology and the transfer of computer technology to developing countries. The second section reviews studies related to a) computers in education, b) computing in higher education, b) computer readiness and attitude, and d) human resources in computers. The third section deals with the literature related to the development of informatics in Algeria and in higher education. It also provides information about the adminstration and the structure of the Algerian university system.

Computer Technology

Computers are a phenomenon of the twentieth century. A computer is an "electronic device that has the ability to accept data, internally store and automatically execute a program of instructions, perform mathematical, logical, and manipulative operations on data, and reports the results" (O'Bien, 1986:8). In short the computer can receive, store, retrieve and process information. Before the appearance of the computer, devices such as Napier's bones, Liebnitz's calculator, Hollerith's punched card, and many

others, more were invented. The human needs to count and to measure were the forerunners in the search for an efficient tool.

The first prototype computer was developed by Eckert and Manchly, known as ENIAC (The Electrical Numerical Integrator and Calculator. ENIAC was a huge machine that weighed thirty tons and was run on 18,000 vacuum tubes (Dorf, 1977). Then UNIVAC (the Universal Automatic Computer) became the first commercial computer and the first generation of computers.

In the mid-1950's, the second generation was introduced, with transistors and microtransistors replacing vacuum tubes, which led to a smaller, faster, and more dependable machine. The microprocessor is the most recent innovation, and its introduction brought a significant change in the shape, the capacity, and other characteristics of computers. The third generation (1964-1971) replaced the transistorized circuitry by integrated circuits in which all the elements of an electronic circuit were contained on a smaller silicon chip. The fourth generation is characterized by the introduction of the large-scale integrated circuits. This allowed the development of minicomputers and the extensive use of timesharing.

Microcomputers which appeared on the market in 1975, are becoming very popular in the western nations, as well as

in other parts of the world. Ten years later, more than 20 million personal computers were in service in the United States of America alone (O'Bien, 1986:26). This number is estimated to increase to a total of 60 million personal computers by 1997 (Sullivan, Lewis, and Cook, 1985). The growth of the microelectonics industry is expanding very fast. The value of the worldwide production of computers reached 71.3 billion dollars in 1985 (Electronics Week, 1985). This number is likely to rise in the coming years. Hinkelman, one of the the Silicon Valley scions, commented that microelectronics is the foundation technology for any industrial process in the future. From that perspective, "the world leader in microelectronics will lead the world in everything else" (Forester, 1981:71). Without doubt, the computer is here to revolutionize communications, transportation, manufacturing, management and education.

The computer is a reality of our time, and it is going to stay for the time to come, to explore new frontiers. The giants in computer industry like the U.S.A and Japan, are spending billions of dollars to win the race for the super computer, known as the fifth generation.

The Transfer of Computer Technolology to Developing Countries

The transfer of technology, characterized by its complexity and multidimensionality, has been around as long as technology itself. Technology is not, per se, an end,

but a support, and a means to achieve specified objectives and goals. The transfer of technology embodies three forms of capitals: material, knowledge, and human. The process of the transfer of technology is considered to cover also the basic concepts of knowledge on which technology is founded, as well as the attitudes and motivation required for the evolution of that knowledge.

Developing countries - faced with massive needs and limited funds - are divided between priorities of satisfying the basic needs of their people and the demand to provide the conditions for further development. One of these conditions is to improve the process of production and services. Otiende, a lecturer in education at Kenyatta University expressed the local problem of Kenya, stating that:

> We have a basic problem of electricity; it is not widespread. We hope to take advantage of computer technology, but we want to do it gradually. We are doing our best to get phones and postal services into the villages (Turner, 1982:32).

Amid these kinds of difficulties, there appears to be a genuine concern about the role of the computer in the assistance of developing countries. In spite of the falling prices of computers in the market, however, many developing countries cannot afford the luxury of purchasing them. But even when the financial barrier is removed, difficulties still manifest themselves in terms of professional manpower, software adaptability, maintenance and other technical

problems. Thus, the issue here is complex and needs to be studied thoroughly.

In spite of these obstacles, and others, writers believe that computer technology may offer the last chance for developing countries to catch up. Harvey, (1982:265) underscored this idea, stating that:

> It is not an exaggeration to say that effective utilization of computers in underdeveloped countries could lead to a positive outcome in what Arnold Toynbee has called a rise between education and catastrophe.

In a United Nations' report, it was stressed that computers can themselves be one of the principal instruments for the transfer of technology (Parker, 1978). On the other hand, caution has been called for in the adoption of this particular technology. Some have argued that it might only deepen more the dependency of the underdeveloped countries upon the advanced nations (Harvey, 1982). The same author stressed that computerization cannot be allowed to become a new form of cultural imposition of neo-colonialism, which is not acceptable, even in an automated package. Regarding the state of informatics in Latin America, Natarajan (1984) quoted an important observation signed by Wionczek, a Mexican author. He stated that the mass invasion by the computer science is a result of fashion and selling techniques, not a reflection of an information explosion.

The computer technology, known as "high technology", has been involving a long and intensive research, high

budget, and highly skilled manpower. It is apparent that developing countries could not afford to invest in this area for many reasons, such as the absence of human and material resources. Accordingly, it does not come as a surprise that their contribution to the worldwide scientific research is very small and does not exceed 5 percent (Attalah, 1984). Today, "while these countries have not been able to assimilate the possibilities provided by the industrial revolution, they are facing a more complex phase of technology provided by microelectronics technology" (King, 1982:25).

It seems that in order to benefit from this technology - if the willingness exists - there is no alternative to developing a general policy for the transfer of computer technology. The central issue of concern would then be presented in terms of how the transfer of computer technology would be done and what alternatives exist to making an appropriate transfer. The literature of the transfer of technology in general pointed out some relevant approaches. With regard to the transfer of computer technology, Priebe (1978) distinguished between two used approaches: the direct approach and the indirect approach.

The first one consists of the tranportation of an operating system to a recipient country. This turnkey system has among its disadvantages those related to communication facilities, system language versus local

language, and system maintenance and control. This approach enables faster implementation and often lower cost, but there may be limitations to the external package in the compatibility with the specific requirements of the local needs.

The second approach which is more important, involves the transfer in the form of relevant information and knowledge. The operational system is developed after the accurate definition of the requirements is completed. A third alternative which was suggested by the same author stands as a self-teaching technique. In this approach the imported operating system is regarded as an experimental tool for the native techniciens in order to develop a further final system. The software being produced locally usualy requires more time, energy, programming and financial capabilities. It generally leads to a greater acceptance and subsequent success from the system.

Since the transfer of computer technology in this case is oriented toward a non-technological country, its success will depend a great deal upon the local conditions representing the cultural and social context. Kalman (1981) insisted on the necessity of considering a broad range of social, economic, cultural, and technological strategic issues when dealing with the transfer of computer technology. If these conditions are not respected, this is likely to lead to failure and disappointment. Along this

line, Cotterman and Zmud (1981) underlined a warning that if technologies are simply injected into a society, the society may be unable to morally assess the use of the technology as the implications of misuse might be totally outside any available frame of reference.

Along the various levels of economic and social development, there is a variety of computer development stages within developing countries. To illustrate this, Paker (1981) borrowed a set of criteria from a United Nations' report which classifies these criteria regarding the level of computer development in four stages. The summary of these criteria is noteworthy, and is presented below:

Stages	Characteristics of the stages
Initial	A few installations (possibly mainframe of older gneration) are to be found and run by a foreign expertise. There is no national informatics education.
Basic	There are numerous computer installations run by nationals. There is some design of software production.
Operational	Most of government and administrative work is carried out by computers. There is a comprehensive informatics policy.
Advanced	The informatics industry is important in the national economy with a multinational dimension. The introduction of informatics become crucial for government.

The use of the computer in developing countries concerned mainly public institutions and government agencies, such as banks, and some other applications which involve planning and computing. Some of the developing countries in Asia and South America are exploring an important number of local applications. Brazil and India had interesting experiences in initiating local computer industries and software development. The Brazilian hardware producers were able to launch a local computer industry, and to produce, for example, clones of the IBM-PC. The achievement of such a goal is still complex and "victories such as those they have won are anything but permanent" (Evans, 1986:804).

Kaypros, an American computer company, was reported to be involved in different projects in developing countries. In Sri lanka for example, a networking project to link ten major universities and research centers was reported to be capable of increasing the knowledge base of all involved in the knowledge work. The exciting thing which was mentioned about this program is that people are coming up with applications for microcomputers that could never even be imagined in the United States.

Even though these experiences, and others, may seem to be exciting, they usually meet with special difficulties specific to the world environment. In an attempt to introduce microcomputers to an university in Jamaica, Webb

(1986) reported a number of problems which may be worth noting. Once the computers were installed in the university, unexpected problems emerged . The first burden was to face the problem of security: stronger doors and anti-burglar systems have to be installed. Second, an air conditioning unit was then acquired to prevent dust. The problem of power cuts and fluctuations of electricity is well known in most of the developing countries. In this case it was then necessery to purchase a voltage supply unit. It was also reported that computers were seen to be safe places for cockroaches to hide from the pest spray which takes place on the campus!

One of the hallmarks of frustration with technical equipment in developing countries is when the equipment is left idle because of a defective circuit board or part which takes months to be replaced, due to lack of proper back-up (Chandra, 1984). These kinds of problems show that the difficulties related to the introduction of computers to developing countries are largely specific to the local environment, in its general meaning. Thus, it is not a simple question of installing the machines but involves a whole vision about the current and projected objectives and capabilities.

Computers in Higher Education

The development of computer uses in higher education depends on many conditions. Blakeslay (1967) wondered about this phenomena when he stated that it is almost paradoxical that education - from which new minds are cultivated - is almost certain to be the last to take advantage of its own labors. This researcher preferred to present the material related to computing in higher education according to four elements of the development model: 1) technology capability; 2) computing utilization in higher education; 3) computer human resources; and 4) computer attitudes.

Before further discussion, it should be noted that computing is not regarded as the panacea of all higher education problems but as Miller (1976:6) noted :

> Computing is not the only means of increasing productivity or improving the quality of higher education, but it is an important means, and we shall no doubt see greater use of computing in the laboratory, the library, the classroom and administrative offices.

Universities and colleges have several goals. Some of the major goals include the production of basic and applied research, education of the student, the operation of an efficient administration system and service to the community (Emery, 1980).

Institutions of higher education in the West are among the institutions that have been affected by computer technology. The entrance of the computer in American

campuses goes back to 1944. By 1960, there were 6,000 digital computers in use and 200 campuses had computer centers (Outhouse, 1985). The use of computers in those institutions took different dimensions according to their financial capability and their academic ambitions and objectives. Research and studies are increasingly developing a framework to introduce the computer in various aspects of education (Harvey, 1983). There is great interest in computer applications in higher education on the part of computer businesses and educators. Besides the use of computerized data processing for administrative purposes, the computer is being used for simulation, artificial intelligence and many new areas of research.

Computing in Higher Education

The use of computers in education has been relatively slow by comparison to its use in business institutions. Blakeslay (1967) wondered about this subject when he stated that it is almost paradoxical that educators -from which new minds are cultivated- is almost certain to be the last to take advantage of its own labors. Nearly everyone connected with computing in higher education recognizes its potential for making improvements in the quality and efficiency of higher education (Robins et al., 1975; Danielson, 1985:85). Computers have been on university and college campuses for different purposes. They are studied as a subject and used

as a tool in many areas, such as for instruction, in administration, and in research. Computers are used to manage the university's control of space, buildings, and classrooms and for offices' maintenance. In short, as was predicted by Cafferey and Mosmann (1967:69), the computer "may affect the whole academic community and intellectual life."

The applications of computers in higher education have been classified into various stages of development (Robbins et al., 1975; Hines, 1977). Hines, for example, considered four developmental stages. He stated that the initial stage was considered as clerical in nature, such as payroll, financial, accounting, scheduling and grade reporting. The second stage was characterized by the integrated system approach, which attempted to utilize information from various sources. The third stage was the total system approach, and attempted to eliminate duplication in gathering, coding, and processing data for segmented systems. The fourth stage was suggested to utilize the total system approach in an attempt to provide information needed for management.

Caffery and Mosmann (1967:82) concluded from their study in fifty colleges that they had not encountered a "single model of wisdom." They stated that the history of most first encounters with computers shows examples of

errors in jugement, misunderstandings and plans which could not be implemented.

Mays (1984) reported an important study conducted by Alderman. This latter compared computer utilization in two types of American institutions of higher education: those operated by minorities and those operated by non-minorities. An important reported finding stated that there was no significant difference in terms of computer installations reserved for administration applications and instructional use in the two types of institutions. However, there was a difference relating to computer installations for research purposes. Additionally, he found that fifty times as many students at non-minority-operated institutions were exposed to computers as were those at minority-operated institutions.

Administrative Use:

There is a general agreement that the computer can be a valuable tool in many administrative activities (Levien and Mosmann, 1972). Many repetitive tasks have been completely automated, and many errors that were common in the administration in the past, have been almost eliminated.

The impact of computer technology in the administration of western universities has many benefits. Neiheisel (1979) conducted his investigation in five selected American universities. He concluded that the major benefits from the

contribution of computers were the following: 1) an avoidance of staff increase; 2) a better service; 3) an improved management; and 4) more readly available and accurate information. Other advantages were also reported by others (Barcomb 1981; Canning, 1985; and McIsaac, 1984). They stated the following characteristics:

1. Faster access to information. Speed represents the potential for significant work at a very low cost.
2. Reduction in misfiling. Chronological or numerical ranges can be selected.
3. Users can search for a document through more than one entry point; they can access by subject, date, or others options.
4. Reduction in amount of office floor space.
5. Storage efficiency through shared access.
6. Portability of files.
7. Time and geograghic transparency for access.
8. Limited dependence on human knowledge of filing techniques.

In a study conducted at the Arizona State University (U.S.A), it was shown that using the remote terminal method of accomplishing routine tasks in offices typical of universities is more efficient with regard to time than the manual method, to accomplish the same routines (Dunham, 1971). The same study concluded that the per run cost

efficiency of performing routine tasks characteristics of universities, is better for remote terminal methods than for manual methods, when an on-campus timesharing system is used.

Computers in universities have been labeled under different names like " The Electronic University," "Telelearning," "Virtual Classrooms," and "Teleconferencing." These labels, among others, refer to different applications of computers in the activities of university life. Some of these activities are administrative applications which can be identified in general as follows (Heinzel, 1968:71)

1. Student Personnel Services

Admissions: Profiles, progress reports, and research. Financial aid (scholarship).

Registration: Maintenance and updating, necessary statistical reports.

Scheduling: Development of computer scheduling programs; maximum space and faculty utilization with maximum flexibility.

Achievement records: Grade reporting; permanent records; grade point average or annual grades mean.

Student files: Student profiles; comparison studies.

2. Administrative Assistance

Educational: School planning; department reports.

Business: Accounting system; purchasing; personnel.

In recent years, there has been a significant rise in the use of microcomputers in higher education. As Gillespie (1981:174) noted, administrative applications represent "the most rapidly increasing use of computers in higher education." In a survey conducted by Stakenas (1985), in which he investigated the uses of microcomputers in educational institutions, he found that word processing and miscellaneous database management were the most frequently used in microcomputer applications.

One of the major uses of computers in administration covers registration, scheduling, grade reporting and recording. The key reasons for this automated trend are the possibilities and advantages that the system offers in terms of cost and efficiency. Another reported advantage is the ability of the automated system to go beyond the purely record keeping ability by moving toward research and analysis, for administrative decisions. The computer was considered because of the fact that these areas involve a large amount of clerical work and the load was heavier at certain periods of the year than at others.

An important study signed by Rourke and Brooks (1966) showed that 53 percent of all American institutions of higher education were using computers for administrative purposes. The administration of student affairs was the

dominant area of computer use in these universities. The study indicated also that 91 percent of computer use in the administration of student affairs were in the area of registration, followed closely by grade record keeping, and general student records.

Today, these numbers are becoming obsolete, and it is hard to find any university which is still managing its activities without the computer tool. One important aspect of this development is the software improvement which computer users largely depend upon. In the United States, for example, higher education software is typically written by faculty members, often with the support of their institutions or through industry-sponsored programs. Software (of a relative quality) is available on the market. In a review of the evaluation of the software used in administrative activities 93 programs were considered (Thomas.L et al., 1986). Among these programs 58 were evaluated as good or excellent, the rest of the programs were evaluated as fair or poor.

Instructional Use

It is no longer a question of whether or not contemporary educational institutions will have the computer but rather it is a question of how should be introduced, and how many computers these institutions should have. Computers, and especially microcomputers, are being used in

educational institutions for a variety of activities, including instruction. Many studies have been concerned with the use of computers in instruction (Billings, 1983). It is concluded that classroom instruction assisted by computer has generally been successful.

Computing in education can be accommodated in three modes: as a tutor, as a tool, or as a tutee. Tamir (1985) listed a variety of computer uses in instruction. They are summarized as follows:

The use of the computer as a tutor: This method is the most widely used. It includes drill and practice, course review, remediation, testing, homework, and instructional dialog.

The use of the computer as a tool: Computers are used as instructional tools in many areas, such as calculation and statistical analysis, writing and word processing, drawing, information display, generation of teaching aids, data accumulation and processing, information retrieval, decision-making and problem solving, and simulations and games.

The use of the computer as a tutee: In this case of instructional use, the users teach (program) the computer. One well-known example is LOGO. These techniques were being used in a number of developing countries. Three cases were reported by Akinyemi (1986): in Argentina, Nigeria and in Morocco. The conclusions from these experiences indicate

some successes as well as some failures. For example, the Moroccan experience, initiated by the policy-makers resulted in a lack of enthusiasm among teachers.

Western countries have already started to visualize the impact of computers for the future, and a great effort is being invested in expanding the "second literacy." The United States of America is considered to be in the vanguard in computer education (Electronic learning, 1985). By the end of this decade, two million microcomputers will be in operation in American schools. Besides the formal computer education, many programs aiming at bringing high technology to the general public have been developed. In Califonia the networks of Computer Towns came out as one of the first programs in this direction (Gerver, 1986). This change was initiated by some educators, but mostly orchestrated by computer businesses.

Australia is another country which has introduced microcomputers into more than 60 percent of their secondary schools, plans are under way to their introduction into the lower schools as well. All Australian States provide courses in computer appreciation in primary schools. In Europe, the same experiment is taking place. The French government plans to increase the number of computers in primary and secondary schools from 54,000 to 100,000 microcomputers. Germany, Sweden, Great Britain, and others, are all introducing computers in their educational

institutions. This trend did not come from a vacuum, but it is, rather, a mature move to computer readiness for the future.

In Lehigh University at Bethlehem, Pennsylvania, an important project included 129 campus buildings. Simultaneous computer and telephone network capabilities were provided in every student's residence, and in faculty and staff offices (Tech Trends, 1986).

2) Computer Use in Research and Libraries:

There has always been strong evidence that information is the heart of knowledge and learning. The library stands as the primary source of information. Traditionally, information is conserved in print. For the task of managing books and documents which can take a mountain of space, computer assistance can no longer be ignored. Computers are used to process the clerical functions, such as ordering books, paying bills, cataloging, indexing and retrieving.

There are many turnkey systems in the domain of library automation, and issues such as environmental requirements for the computer, hardware problems, capacity planning and operation, have quickly begun to arise (Brownrigg and Lynch, 1980). Other options, such as in-house development, are likely to be time consuming, and need highly qualified specialists.

In the field of research, the computer has a special role to play. It enhances and facilitates the research process. Computer is used extensively in medicine, aerospace, agriculture, construction and the list goes on and on. It is also important to mention the ability of the computer to be used for simulation and artificial intelligence make it a unique instrument in the domain of research and exploration.

Human Resources and Computing in Higher Education:

One of the major barriers to computing, besides the complexity of the computer industry itself, is the resource requirements. To put computers to work, a minimum number of qualified staff and professionals is required. A great deal of both time and effort are involved in the process of computer implementation, and the success of any computer implementation is a corollary of the skilled local manpower. Many of the developing countries have their computers in a state of under-utilization because of the lack of qualified staff. In Brazil, for example, the development of the skills necessary for the local computer industry needs has been underway for at least a decade. There are two common ways to train computer students: the first option is through local institutions, and the second is obviously in foreign institutions, usualy in the advanced nations. In both cases, the developing countries must make big sacrifices.

Many computer experts from the less developed countries migrate to nations where better conditions are offered. This results in a serious loss of highly qualified manpower. Almost 50 percent of the 52 Algerian students enrolled in universities in the city of San Diego (United States) alone, did not return to their homes for varying reasons.

Gulati (1981) argued that it would be quite naive to believe that many developing countries will become self-sufficient, in terms of academics and trainers of their own, without eliminating or neutralizing the basic problems characterized by some of the following factors: a) salary, b) computer equipment, c) curriculum , d) volume of work, e) level of work, f) quality of performance, g) self development opportunities, h) research and consultancy, i) procedures, J) promotional prospects, and K) organizational matters.

Computer education and computer awareness are the normal bridges to the creation of a pattern of the interest in computers. It is considered very important to introduce computer knowledge in its varied forms. Computer awareness programs could familiarize people with the potential of the computer in the context of economic conditions, and the society as a whole. Computer education and computer initiation are thus the basic conditions for informing individuals and increasing their awareness. It is evident that human readiness and capabilities are the crucial

conditions for the development and the adoption of technological innovation.

Computer education, considered as the "second literacy," is expanding through special programs. In England, for example, two important projects have been undertaken. Microtrain is a moving train which demonstrates to the general public the latest techniques in information handling and retrieval (Maddison, 1983). Another means for computer awareness is through the mass media. The British Broadcasting Corporation (BBC) initiated an educational program for public awareness in the computer world.

Computer Attitudes

The success of a computerized system is based mainly on the characteristics of the people concerned with its success. The extent of individuals' readiness is very crucial in the success of computer adoption. Lucas (1975) reported that the positive attitude toward computer output, and its potential, were all predictors of a high level of use. While technical characteristics of computer systems may result in its failure, external issues such as politics, users' behavior, and factors within the organizational setting must not be overlooked (Turner, 1982).

Resistance to change is a very common issue in the implementation of new innovations. It was communicated in a United Nations (U.N) report that when discussing the

relationship between computers and society, many people expect from this technology too much too soon, others fear that the creation of large data bases might contribute to a loss of human rights (Kalman, 1984). Many studies confirm that ignorance and fear by individuals regarding the system's introduction could result in resistance to change. Wedman and Heller pointed out some of these factors which make change difficult to implement. These factors are a lack of resources such as time, equipment and sensitive training (Fahy, 1985). In his own study, Fahy (1985:76) concluded that:

> Instructor resistance to change is not monolithic or arbitrary, but it is often based on specific assumptions and concepts, or may arise from identifiable gaps in policy, recommendations, or training.

It is becoming a convincing argument that if the recipients were not involved in the process of change, it is likely to rise a great deal of resistance, and if innovation is imposed authoritatively, with no support, it will not succeed. An important study, conducted by Brown (1984) in two American school districts, investigated how personnel react to changes in administrative computing. The main objective of this study was to determine the perceived barriers and facilitators of moving to administrative computing. The results showed that 87 percent of the respondents indicated positive personnel disposition toward the innovation. The perceived advantages identified two

factors as the primary advantages to the application of a computer for administrative tasks. The first one is time which can be saved, due to speed processing. The second major benefit identified was the versality and flexibility of the programs themselves, and cost effectiveness.

Other advantages mentionned were as follows: a) the elimination or reduction in tedium of certain tasks, b) quick tournaround of data used in an house system, c) improved circulation control in the library, and d) quicker retrieval of student demographic and emergency data. The major disadvantages were the frustration and impatience displayed when the computer did not function as anticipated.

Most of the results of the studies that dealt with attitudes toward computers were not consistent. Family (1980) reported that Beauvegard found personal factors such as age, school level, curriculum area, and computer experience were not indicative of either favorable or unfavorable attitudes toward computers (Family, 1980).

On the other hand, Family concluded from his own study that differences in personal factors did indicate differences in the attitudes of academicians toward the general use of computers. Those factors were identified as age, field teaching, and years of experience in teaching. Younger academicians tended to have a more positive attitudes toward the general use of computers. Academicians

with experience in teaching had a more favorable attitude than those who had less experience.

In an another study, Malaney (1986) analyzed the attitudes and perceptions of faculty members and administrators in the academic units, regarding the need for, and potential use of, the computerised data base system as a device for monitoring data to graduate education. The author concluded that the overall support for the data base system was very favorable. Additionally, administrators and faculty members foresaw more advantages than problems. Another study conducted by Loyd and Gressard (1984:76) found that computer experience was a major factor in computer attitudes. Three types of computer attitudes were cited. They were computer anxiety, computer confidence, and computer linking. These views were supported by the Gustafson (1985) study. This latter study found that the positive attitude toward computers increases after administering computer precourse and postcourse. These results seem to suggest that computer experience shapes attitudes.

Another study conducted at the University of Georgia indicated that 78 percent of a sample of 976 students had convenient access to computing equipment and have shown a high interest in computers (Jackson; Clements and Jones, 1985).

Introduction to Algeria:

It is relevant to this study to introduce some information describing briefly the Algerian economic and social environment. This will give some insight to an understanding of the conditions which affect higher education in Algeria.

At the beginning of the country's independence in 1962, Algeria's economy was disorganized and non or less integrated. It was a national endeavor to fill the many jobs left by the former colonial settlers. The Algerian economy might be characterized by three distinguished periods, represented by three successesive presidents.

The 1962-65 period emerged from a heavy struggle for independence and thereafter met with a large number of difficulties, and a back up in industrial and economic activities. For instance, as many as 1,400 enterprises out of 2,000, operating within the construction field and public works, completely disappeared. Another 100 industrial plants were shut down. With the exception of petroleum production, all of the other industrial and economic activities significantly decreased.

The second period (1965-78), represented a real launch into heavy industry. Inspired by the theory of development known as the industrializing industry, the nation benefited from heavy industrial investments (43.5 percent of all investments for the second four-year plan 1974-77). During

this period, a nationalization process of vital foreign interests was undertaken. It should be noted that despite the advantages which can be concluded from the development strategy based on industrialisation, the social and economic infrastructure have not benefited from those investments. The cost of this choice created many problems in shelter, food and transportation. Besides that, the "Agrarian Revolution" which was expected to accomplish social and agricultural promotion, met with structural and organizational difficulties and therefore resuled in practical disappointments.

The third period - described by many observers as a period of pragmatism and realism - represents the present (1978) regime, which carries out a policy of balancing the growing industrial plans with a satisfying social and economic infrastructure (Ghiles, 1984). More emphasis has been given to investments in housing, transportation, agriculture and water and goods consumer supply. It was the intention of the present regime to slow down the heavy industrial investments, in order to focus on better management, and control of the operating national corporations. Some analysts of the Algerian economy did not share these opinions. For example Bennoune (1985:212) argued that:

> If the industrialization drive had not been abruptly interrupted by the current regime, Algeria industry, if provided with a more satisfactory political environment, would be able today to satisfy the basic needs of the national economy and hence the society as a whole.

In spite of these kinds of critics, one may observe that implementing and transferring a sophisticated industry requires a minimum of social and psychological conditions. The problem of man, was and still is a recurring one, and is due to complex social and political envirnoment. Algeria suffers from a rapidly growing population (3.53 percent per annum, one of the highest in the world). The political awareness emphasis which was expected to increase production and productivity failed to produce a productive output. It is of importance to mention that a need for a rationality in salaries, and establishing an equal opportunity model should be viewed as urgent elements in labor motivation and commitment.

Algeria has thus been following, during the eighties, a "pragmatic policy," in order to improve the performance of the public sector: controlling and improving managerial and financial tasks. It should be noted that hydrocarbons account for 98 percent of Algerian exports and 45 percent of the government revenues. The weight of the economic dependence on income derived from hydrocarbons, and the falling of oil prices created a crisis which led the ruling system to cut down on imports, and to increase the private

sector's share in the economy. This new option will open a new era, not only from the economic aspect, but also in terms of the social and political conditions. Public expectations and attitudes might change and have major effects on Algeria's future.

Informatics in Algeria:

An important event in the domain of computer and computing development was the creation of the National Agency of Informatics (Commissariat National d'Informatique). It was founded in the beginning of the seventies, and its mission was to promote and coordinate training and computer facilities. Among the objectives of the N.A.I were the following:

1- To ensure coordination between various institutions concerned with informatics, and also between national and foreign companies.

2- To assist the educational ministries by providing the necessary means, in terms of computer equipment and technical assistance.

3- To develop a national program in Informatics.

The National Agency of Informatics has the monopoly for importing and marketing all computer equipment. It includes nine different sections, among which the Studies and Research Center is an important one. This center endeavored

Table 1

Number of Computers Operating in Algeria
(1972- 1982)

Computers by manufacturers	1972	1982
IBM	33	42
HB	32	32
Burroughs	—	21
CNI	—	13
Norsk Data	—	5
Raytheon	—	4
HP	1	3
XDS	2	3
others	1	5
Total	69	128

Table 2

Distribution of the Installed Computers in Algeria
(1972-1982)

Region	1972 (%)	1982 (%)
Center	81.16	72.65
West	13.04	19.53
East	5.8	7.82

to train computer specialists and to enhance research activities.

In 1972, Algeria had 69 computers. This number falls into the category of computer industry which one would expect in a third world country. International Business Machines (IBM) and Honeywell Bull (HB) shared almost all these computers. After ten years, the number of installed computers were increased to 128 computers (Table 1). The installed computers were increasingly concentrated in the capital city of Algiers. About 25 percent of the total number of computers were in operation in two other major regions (Table 2).

By 1975, The top management of Technical and Scientific Research of the National Informatics Center initiated a computer industry program. The operation's aim was to purchase the major components of computers and integrate them locally. Assembling of the software and the hardware inside the country, resulted in a savings of 30 to 40 percent. These computers, known under the Algerian name (CNI), were assembled and fully maintained by local technicians. At the end of 1982, more than 13 mini-computers (CNI) were already operating in different public corporations (banks, industrial and educational enterprises).

Building a computer industry and the development of software are not an easy task, and requires a great deal of

effort on the part of the native specialists together with foreign cooperation. The regional cooperation of the Maghreb (Marocco, Tunisia and Algeria) has been always the path of their people. In the domain of computers, this cooperation seems to be more than a necessity. Benmokhtar (1984) convinced of this idea, suggested a frame of cooperation. It includes the following areas:

-- Research and development: including the
  - Use of the arabic language in computers (hardware and software aspects).
  - Vocal communications with computers.
  - Hardware design.
  - Technology innovation in the field.
  - Process control development.
-- Training and education,
-- Industry (specialization of each country in a type of computer),
-- Data bases and documentation,
-- Communication (telematique).

Benmokhtar also suggested that each of the three countries might specialize in a specific type of computer industry. Algeria might produce the medium-sized model and minicomputers, Tunisia the high power microcomputers, and Morocco could produce small sized microcomputers.

Informatics in Higher Education in Algeria

Algeria inherited from the colonial period, one university and two annexes, located in the three major cities. Today, with the application of the "University Chart," the number of universities and university centers have increased significantly, accounting for seven universities and fourteen university centers. Another ten university centers are programmed to open in the near future. The number of students also increased significantly from 2275 students in 1962 to 172,000 students in 1985. All the universities are public universities.

In order to promote informatics, a committee was created at the level of the Ministry of Higher Education. This committee is in charge of the following activities:

1. Formulates recommendations on the policy of informatics at the level of the Ministry of Higher Education.
2. Provides coordination in the domain of informatics in the central administration and in the universities.
3. Identifies the applications to be developed among universities, in order to avoid redundancy.
4. Follow up the implementation of informatics programs.
5. Supervise informatic commitees that deal with the coordination and development of informatics in the university.

The introduction of computer education, which is seen as a means of meeting the needs of the national economy, was carried out jointly by the institutions of higher education and the Informatics Research and Education Center (Table 3). By the beginning of 1982, ten institutions were providing this kind of program, and the number of undergraduate students enrolled in computer science increased from 410 in 1979 to 1490 students in 1984 (Appendix E). Computer education is attracting more and more students and, as one vice-rector mentioned, "everybody wants to be oriented to informatics, it is becoming a fashion" (Frappat, 1985).

The availability of qualified teachers in Algeria is still in short supply and represents a real obstacle to the enhancement of the quality of computer education. In the field of higher education, there are only 124 teachers in informatics, and more than half of these are assistants.

In terms of hardware, higher education has 23 computers, two thirds of which are microcomputers and the rest minicomputers. These units are relatively old, and consequently not consistent with the requirements of a modern computer training center. It has been recorded, for example, that in one university, 550 students used a single computer (CNI 1154, 192 k). In other universities, the obsolescent equipment (IBM 1135, 1969; and Mitra 15) presented many maintenance problems. Computers are used

mainly to teach informatics students; otherwise, more often than not, they sit idle.

Table 3

Number of Graduated Computer Students in Algeria

Year	Type of schools	Engineers	Analysists	Programmers & Analysist prog
1972	IREC	34	23	311
	HEI	--	--	--
1980	IREC	252	393	482
	HEI	28	--	--
1983	IREC	--	--	--
	HEI	86	--	--

*IREC = Informatics Research and Education Center
** HEI = Higher Education Institutions.

The Future of Informatics of Algerian Higher Education:

The Algerian educational institutions are still using relatively primitive techniques for processing the available information required in their daily university activities.

Algeria, as a developing country, has, among its educators and administrators, a tremendous lack of knowledge and information about the great potential of computer services. The traditional paper, pencil and typewriter techniques which still prevail for all educational institutions can no longer provide satisfactory services and assistance in educational management and planning.

A report prepared by the Ministry of Higher Education provided some important information regarding informatics plan for the period 1985-89. The report addressed an overall understanding of the actual situation regarding computers and computer education. It also proposed a plan related to the overall need to promote computer education and computer use in research and administration.

It is projected that there will be an increase in the next two years of enrolled students in informatics which represent 6.2 percent of the total number of students in the technological sciences.

Besides the emphasis on strengthening computer education for professionals, further expansion of computer education to cover all university students has been

suggested. Three groups of student populations were categorized for specific programs in computer education:

1. Computer professionals (Computer Science).
2. High computer users (Engineering and Exact Sciences majors).
3. Potential computer users (Humanities and Social Sciences).

This type of instruction falls within the three categories classified by Levien and Mosmann, (1972:52). These categories are a) specialists' courses, which are intended to train programmers and application specialists, b) service courses, which are oriented to train physicists, sociologists, and philologists (among others), and c) survey courses which give proper appreciation of the benefits and dangers in the spreading usage of computers.

The report acknowledges the problem of the lack of skilled instructors in computer science. For the first category of students, the project suggested the provision of highly qualified academicians. One of the advantages for this option is to train many students locally, and thus avoid or limit the problem of brain drain. The second category of students, those affiliated with technology and hard sciences, were seen as a second category of computer users. It was proposed that a number of teachers from various disciplines would have to go through intensive

training in computer education (two semesters), in order to take charge of the instruction of computer courses taught in those disciplines. The last category, which includes students in humanities and social sciences, was concerned with a program of computer initiation, usually in the form of seminars or conferences.

While the report underlined the importance of computer education for students, and while it considered the rational preparation of the human environment for the success of the informatics tool, it did not mention anything about training administrators, and preparing them for the projected objective of introducing computer data processing in administration.

The equipment projected for the 1988/89 period to be used in the training of computer science, is estimated as follows:

1. Computer science students: one terminal for one student.

2. Students in engineering and technology: one terminal for 25 students.

3. Other students in humanities and social sciences: one terminal for 50 students.

It is projected that by 1988-89 Algerian higher education institutions will spend a total value of 11.22 million dollars on the purchase of computer equipment. The projected types of computers to be purchased are ten

minicomputers (Vax 730-750), two medium-sized computers (Vax 282), and eleven microcomputers (HP 250 or PDP 11/23). These computers will be linked to an approximate number of 554 terminals.

In the domain of management, the report recommended applications such as students' file management, libraries, and research. The report goes on to describe the means to meet the above objectives by stressing education and research. Each university was asked to take full charge of developing and maintaining specific applications within the domain of the university management's activities. The advantages of the options cited by the report were the avoidance of redundancy, and the economy of means. However, this procedure is not likely to create local initiative, because faculty members might not be interested in the selected applications.

Some Organizational Aspects of Algerian Universities

The responsibility for higher education in Algeria is vested in a centralized Ministry of Higher Education. All educational institutions are public institutions and consequently provide free access to education to all levels of the population.

The internal affairs of the universities are administered by rectors. The rector of each university is appointed by the Minister of Higher Education, and is

responsible for the administration of the educational, administrative and financial affairs of the university.

The structure and organization of each university varies in some of their aspects, according to the organizational perception of each rector. It is known that in the short history of the Algerian universities, each new rector implemented his own method. At the present time, the rector of the University of Oran is assisted by two vice-rectors (one is responsible for undergraduate education and the second for graduate and research). He is also assisted by a secretary-general, who is responsible for administration and financial affairs, including the maintenance and logistics of university property.

The Institute System

In the past, the Algerian university was organized into faculties such as faculty of law, science, medicine, etc. These faculties covered many disciplines and departments, which created difficulties and crises in their objectives and functions. The Algerian Higher Education Reform of 1971 was primarly aimed at reorganizing and creating a new structure, capable of meeting the demands of the country. The institute system was started, and was based on three main principles:

a) The specialization of each institute in one scientific and technical field.

b) The autonomy of the institute, in terms of its funds and funtioning.

c) The promotion of teachers' participation in the overall management of an institute.

The directors of institutes at the University of Oran were elected by and from among the faculty members of the institutes to which they belonged. They were usually assisted by two faculty members. The first organized the curriculum of undergraduate students. The second was in charge of the overall organization of undergraduate programs and ensure a better funtioning of the Educational Coordination Committee.

A new formula emerged in the year 1984-85 where the institute director was appointed by the president of the university. Each institute was headed by a director whose duties were to represent the institute, and to ensure the promotion of education and research in his institute.

The Institute Board is constituted of the director, his assistants, the secretary general, and the heads of departments. This board is in charge of program development and institute activities.

The institute has a secretary general who is in charge of managing and coordinating the administrative and financial services of the institute. The secretary general is primarly responsible for student course registration and student progress.

Teachers and students' representatives are the members of the Educational Coordination Committee. They appoint a president and a secretary both of whom are renewed each school year. Their task is to make practical decisions regarding educational student problems, and organization of the curriculum.

Heads of departments are generally appointed by the director of the institute. They control and manage department activities and give their opinions concerning teachers' recruitment.

The Scientific Board is constitued of the director of the institute, his assistants, the heads of departments and teachers representatives.

Admission Center (Centre Unique)

The admission office is responsible for all phases of student registration procedures. It has the responsibility of maintaining official records reflecting student progress toward satisfying degree requirements. The transfer of students is also handled by this administration. The admission center has its own offices which include: evaluation office, foreign student office, and a few other offices, which are in charge of student files in specific fields. The admission center also selects and administers the different entry tests required by certain disciplines.

A great amount of clerical time is used to process student admission. A high probability of errors is manifested, due to the volume of clerical work and the absence of organization techniques and seriousness. Thus, a combination of many factors leads to these problems.

Administrative Management:

A draft of the Informatics Program of the Algerian higher education system considered computing for administrative services as a necessity. It has become a tedious task to control and manage the wide variety of information related to the university population. One of the reasons that led to this situation was that, besides the limited skills of administrators, there was a constantly growing number of students, teachers and personnel, and a wider variety of information was being gathered and processed. The manual techniques in use which were, for the most part, based on personal initiative and by-product experience created unwieldly procedures. Shelves, filing cabinets, desks and even office floor in many cases were covered with stacks of paper and documents which made information difficult to locate when needed. The frustrating picture that can be drawn to describe the situation leads one to conclude anything but organization.

A few basic experiences in computer applications were recorded and are still at the research stages. There is no

operating and complete application in the domain of educational data processing. The computer facilities have so far had only a very limited impact on university activities, and almost no impact at all on administration and management.

Summary

In this chapter, the literature and related studies have been reviewed in three main areas. The first section encompassed information about computer technology and the uses of computer technology in developing countries. The second section was a presentation of computer utilization and related studies in education, and especially in higher education. The third section reviewed the development of informatics in Algeria.

Emphasis was placed on examining the state of computing in higher education with reference to the types of structure and the functions of important administrative structures of Algerian universities.

Chapter Three

METHODS AND PROCEDURES

Introduction

This research adopted the descriptive and comparative methods to meet its objectives. The first method was concerned with the nature of the development of Algerian informatics especially in higher education. The second method was used to compare groups with different characteristics with regard to computer awareness, computer interest, and computer attitudes. The groups in question were characterized by educational levels and types of schools, administrators' positions, fields of education and instructors' positions. The study was aimed at determining the actual computing profile of Algerian higher education. It embodied two main research procedures in order to answer the research questions of the study. The first was a survey on three elements: Computer capability, the use of computing, and an assessment of the computer staff. The second, however, was concerned with an investigation of computer readiness: computer awareness, computer interest and perception of computer utilization.

The Research Design

In order to meet the objectives of the study, the

investigator selected two complementary techniques : interviews and a questionnaire survey. A preliminary study was conducted to collect a list of the administrative problems faced by each institute or office.

In the interviews these major questions were addressed:

- What are the administrative problems of Algerian Universities?
- What are the uses of the computer at the university?
- What are the available human and equipment resources?
- What are the actual computer facilities?

The second approach was a survey questionnaire. It was designed to elicit information about computer readiness and test the research hypotheses.

Although the research hypotheses were unidirectional, they were converted to null hypotheses, which consisted of statements of no difference per se. This procedure was suggested by Ballan (1982:34) who stated that:

> The null hypotheses are immune from the 'directory issue,' since they are always statements of no difference or no relationship.

The null hypotheses are thus presented as follows:

NH 1. There is no significant difference between the perceptions of administrators and instructors towards computer utilization.

NH 2. There is no significant difference between the perceptions toward computer utilization of

instructors from the field of Hard Sciences and those affiliated with Humanities and Social Sciences.

NH 3. There is no significant difference between the perceptions of the higher educated group and the lower educated group regarding computer utilization.

NH 4. There is no significant difference between the perceptions of instructors and administrators graduated from local institutions and those who graduated from foreign schools regarding computer utilization.

NH 5. There is no significant difference between the perceptions of instructors and administrators who had computer experience and those who did not, relative to the use of the computer.

NH 6. There is no significant difference between the perceptions of administrators and instructors who demonstrate a willingness to learn how to use computers and those who do not.

Source of Data

Administrators and faculty members were the participants selected to provide the necessary data for this study. They represented various institutes and departments at the University of Oran. The sample which participated in the study was constituted of 79 instructors, and 23 administrators and instructors performing administrative tasks. The University of Oran is one of the largest universities in the Algerian higher education system. It is located in the city of Oran in the western part of Algeria. The university employs more than 1000 teachers for its 13590 enrolled students. The majority of students are those enrolled in medicine (3666 students) followed by the institute of biology (1642 students) and the institute of law and administrative sciences (1486 students). For practical reasons all instructors in the study were categorized according to their discipline affiliation:

1- Humanities and Social Sciences.

2- Exact Sciences (Mature or Hard Sciences.)

The Humanities and Social Sciences encompass the following institutes: Social Sciences, Foreign Languages, Economic Sciences, and Law (among others).
The Exact Sciences cover Physics, Mathematics, Medical Sciences, and Earth Sciences (among others). Fourty-seven respondents were from Hard Sciences and 40 respondents were from Humanities and Social Sciences.

Instrumentation

To meet the purpose of the study, the investigator selected a combination of investigation techniques: Interviews, questionnaires, and observation.

1) Interviews:

The interviews were used to gather data to answer research questions and were posed as follows:

What are the administrative problems?

What are the types of equipment used (computers) at the institution?

Does the institution use any kind of computing technology? and if so what?

What is the current availability of computer professionals at the institution?

2) Questionnaire :

The second section of this survey dealt with the perception of administrators and faculty members toward the computer impact on institution activities. It was also the purpose of this section to assess the state of computer awareness and computer interest of the population under study. A questionnaire was developed for this purpose which is explained below (see also Appendix A).

3) Visitations of computer centers were conducted and were aimed at determining what kind of computers were in operation, how many were being used and for what purposes.

Also questions related to computer utilization were directed to the Computer Center' coordinators related to the computer center' activities.

Description of the Questionnaire

The questionnaire consisted of four sections: 1) demographic information; 2) six questions related to computer awareness; 3) seven questions related to computer interest and 4) eleven questions related to computer attitudes. The content of each section is described as follows:

1) Demographic information

This consists of six items: job; position of faculty members; position of administrators; level of education; field of education; and country of education.

2) Computer awareness: attendence at computer seminars or workshops; enrollment in regular courses in computer science; information about job related computer applications; desire to have a computer; have seen a computer; have used a computer.

3) Computer interest

This contains seven items: I like to use a computer; It is pleasant to work with a computer; I am interested to learn how to use a computer for research purposes; I am interested to learn how to use a computer for word

processing; I am interested to learn how to use a computer for programming; I am interested to learn how to use a computer to develop my own knowledge.

Three open ended questions followed the computer interest item which asked respondents to 1) explain why they were interested in computers, 2) if not interested why, and 3) what are the positive or negative comments regarding using computers at the university.

4) Perception of computer potential

This includes eleven items : A computer is a luxury for our society; a computer is a luxury for our institution; there is an urgent need for computer use in student affairs; a computerized personnel file is a necessity; a computer is necessary for scheduling; for the library; for the university management; it is not the right time to think about a computer; a computer does not have any advantage for our institution; computerization is not the key solution of the problems of our institution; computerization requires a system reorganization of the institution.

The questionnaire was then translated in Arabic and French, the two languages used in the Algerian higher education system (Appendix B and C). Translation was done by the investigator and then reviewed for accuracy by two independent language specialists.

Validity and Reliability of the Questionnaire:

The validity of the questionnaire was estimated on content validity. The items of each scale (computer awareness, computer interest, and computer attitudes) were presented to three faculty members. These judges were asked to look at each item and answer by a "yes" or a "no" in terms of its meaning with regard to what was being measured. Then the judges were instructed to rank the "yes" items as to whether they were representative of what was being measured. The strongest items were then accepted, others were either reformulated until they were judged as being strong or were dismissed. This process was repeated for each scale.

Concerning the reliability of the questionnaire, three Algerian instructors affiliated with Algerian industry agreed to participate. Their role was to assess each item, with respect to its meaning from the point of view of a university setting. The objective of this process was to determine the consistency and the stability of the meanings of the items.

Procedures

Before the beginning of this study, an agreement was reached with the Vice-President of the University of Oran, to conduct the research.

The pilot study was conducted in the summer of 1985. Twenty questionnaires were administered to faculty members. The objective of the preliminary study was aimed at a review of the items. The questionnaire was then redesigned taking into consideration the observations made by the subjects. Nine interviews were made possible with administrators, officials of the university and instructors.

At the beginning of September of 1985, the researcher started to make contact with the officials of each institute (directors or their assistants). The main objective of this operation was to inform them about the study and its goals. One hundred and fifty questionnaires were distributed in the instructors mail boxes located in each institute. A further 50 questionnaires were administered randomly to the administrators of the university.

Unfortunately, the mailing approach was not satisfactory and only a few questionnaires were returned. Consequently, 200 more questionnaires were then distributed directly to teachers by the investigator, with the help of some colleagues.

Of the 400 questionnaires that were distributed to the subjects, 120 were returned. Thirteen of the returned questionnaires were discarded because they were left unanswered or were incomplete. The remaining questionnaires (107) were, thus, used in the analysis.

Analysis of Data

To identify the appropriate statistical tests, the Tuckman table was used (Tuckman, 1978:255). Descriptive statistics which included frequencies, means and standard deviations were applied.

An analysis of variance was performed in order to test the differences of the perception towards computer utilization against the following variables: Administrators versus faculty members, instructors from humanities and social sciences versus instructors from hard sciences, levels of education, type of schools, administrators' and instructors' positions.

If the F ratio was determined to be significant, a multiple comparisons procedure was used to determine which means were significantly different from others. The Scheffe test was selected for its capability and its merit (Dowdy, and Wearden, 1983). The Scheffe test was modified in order to be used for unequal groups. To test hypotheses, the items regarding the perception toward computer utilization was examined. However, in order to accept a hypothesis, three or more items of the items attitudes must be significant in difference.

Data analysis was performed on the Zenith Z200 PC, using the Statistical Package of Social Sciences (SPSS/PC+).

Chapter Four

FINDINGS

The purpose of this study was to determine the actual profile of computing at an Algerian university. This chapter contains two complementary sections. The first section provides the results regarding testing of the hypotheses which related to the perception of administrators and teachers towards computer utilization at the university. It also provides the findings regarding computer readiness, which deals with a) computer awareness; b) computer interest; and the perception towards computer utilization.

The second section identifies the major administrative problems of the University of Oran that might be alleviated by computer support. It also includes a description of: a) computer capability; b) computing utilization at the university; and c) computer human support. The results of the second section were gathered from interviews with the authorities and staff of the university. The university administration documents and visitation notes were used for the same purpose.

Section One

Computer Readiness of the Respondents

Description of the sample

Table 4 includes data which indicate the occupation

of respondents who completed the survey questionnaire. From a total of 107 respondents, 79 individuals were instructors, 23 were administrators, and 5 were instructors performing administrative tasks.

Table 4

Number and Percentage of Respondents by Occupation

Occupation	Number	Percent
Instructors only	79	73.8
Administrators only	23	21.5
Instructors with administrative tasks	05	04.7
Total	107	100.0

Table 5 lists the distribution of respondents along five educational levels. Seventy-four individuals had attained graduate levels which represented 69.2 percent of the total sample. The individuals with the post-secondary levels represented 16.8 percent, and those with junior high levels only, 10.3 percent. The lowest percentage obtained consisted of primary and high school levels. These latter

levels represented only 1.9 percent each of the total population.

Table 5

Number and Percentage of Respondents by Level of Education Completed

Level of education	Number	Percent
Primary school	02	01.9
Junior high level	11	10.3
High school level	02	01.9
Post secondary	18	16.8
Graduate level	74	69.2
Total	107	100.0

Table 6 shows the number and percentage of the respondents with regard to their fields of education. Instructors and administrators who worked in the Hard Sciences Institute represented 43.9 percent. Humanities and Social Sciences Institutes represented 37.4 percent of the respondents. The rest of individuals were those who worked in other university services (financial and payroll administration, personnel service, and administrative staff working closely with the university president).

Table 6

Number and Percentage of Respondents by Field or Discipline

Field	Number	Percent
Exact Sciences *	47	43.9
Humanities and Social Sciences	40	37.4
Others	20	18.7
Total	107	100.0

* Exact Sciences are also called Hard or Mature Sciences

Number and percentage of instructors by academic positions are presented in Table 7. The categories of non Tenured Assistants (Assistants Stagiaires), Tenured Assistants (Maitres Assistants), and Associate Professors (Maitre de Conference) share the highest number with 22.4 percent, 19.6 percent, and 30.8 percent, respectively. The other categories are Contract Assistants (Assistants Contractuels) and Professors, which include only three and five individuals respectively in each category.

Table 7

Number and Percentage of Instructors by Academic Positions

Academic positions	Number	Percent
Assistant Contractuel *	03	02.8
Assistant Stagiaire	24	22.4
Maitre Assistant	21	19.6
Maitre de Conference	33	30.8
Professor	05	04.7
Others than instructors **	21	19.6
Total	107	100.0

* Assistant Contractuel = Contract Assistant. Assistant Stagiaire = Non Tenured Assistant. Maitre Assistant = Tenured Assistant. Maitre de Conference = the closest position would be Associate Professor.
** Administrators working in various departments.

Table 8 indicates the type of educational institutions of respondents whether they were graduated from a national or a foreign school. The majority of individuals concerned in this study graduated from local institutions (73 percent). The remaining 31.2 percent graduated from foreign schools.

Table 8

Number and Percentage of the Respondents by Type of Schools

Type of schools	Number	Percent
National (Algerian schools)	73	68.2
Foreign schools	34	31.2
Total	107	100.0

Computer Awareness (experience). Table 9 reports the state of computer awareness of the respondents. The number of respondents who had never had a computer course were 65 individuals which represented 60.7 percent of the total sample. The individuals who had attended computer seminars or workshops were 45.8 percent of the sample. This left 54.2 percent of the individuals who had never participated in computer seminars nor workshops.

An important finding which can be of special interest is that in spite of the relatively high percentage of individuals who had a given degree of computer exposure (computer course 39.3 percent and seminars 45.8 percent),

there were only 16.8 percent who had used a computer in one way or another.

Table 9

Number and Percentage of the Extent of Computer Awareness of Respondents

Item N	Type of computer awareness	Yes N*	Yes %	No N*	No %
7.	Computer seminars or workshop	49	45.8	58	54.2
8.	Computer courses	42	39.3	65	60.7
9.	Informed about computer use in my job	56	52.3	48	44.9
10.	I would like to have a computer	78	72.9	28	26.2
11.	I have seen and approached a computer	64	59.8	43	40.2
12.	I have used a computer	18	16.8	88	82.2

* The total N of 107 was not obtained in a few instances due to failure to answer a specific item.

The respondents who have seen a computer represent less than half of the sample (40.2 percent). The result also indicates that almost half of those individuals who have taken computer courses never had the opportunity to use a computer. Instructors and administrators were asked whether they would like to have their own personal computers if this

were possible. The majority of them (72.9 percent) reacted positively to the idea and only 26.2 percent rejected it.

Computer interest

Table 10 indicates the number of administrators and faculty members interested in learning one or more computer applications. In general the numbers shown in this table illustrate a tendency and a desire of the respondents to learn how to use a computer. Individuals who liked to use computers were 88 against only 11 who did not. The respondents who found the computer a comfortable instrument to work with exceeded 70 percent, while 20.6 percent were undecided, and only 9.3 percent found the computer not comfortable to work with.

In the area of computer interest, the results showed that the respondents found all the applications to be highly desirable. The use of computers for research was the highest priority (77.6 percent) followed by the development of one's knowledge (68.2 percent), programming (66.4 percent), and word processing (57.9 percent). A few respondents also indicated their willingness to learn other computer applications. These applications were related to the teachers' disciplines such as physics, medicine, geology, economics and history.

Table 10

Number and Percentage of the Extent of Computer Interest of Respondents

Item N	Perpcetion toward the computer	Yes N	Yes %	No N	No %	I don't know N	I don't know %
13.	I Like to work with computers	88	82.2	11	10.3	08	07.5
14.	It is confortable to work with computers	75	70.1	10	09.3	22	20.6
15.	I enjoy talking about computers	56	52.3	19	17.8	32	29.9
16.	I would like to learn about computers for research	83	77.6	06	05.6	14	13.1
17.	I would like to learn about computers for word processing.	62	57.9	11	10.3	30	28.0
18.	I would like to learn computers for programming.	71	66.4	05	04.7	28	26.2
19.	I would like to learn computers to develop my own knowledge.	73	68.2	04	03.7	25	23.5

It can be observed from table 10 that the percentages of the individuals who were undecided about computer utilization (from 13.1 percent to 23.5 percent) were higher than that of individuals who were not interested in learning to use computers.

Administrators and Teachers
Perception Towards Computer
Utilization in the University

Each attitude item from item number 20 to item 30 was compounded in a small statement, as is displayed along with the tables in this chapter. Appendix A contains detailed descriptions of each statement. It is also important to note that the five point scale used in the questionnaire was converted into three scales. This change was aimed at simplifying the results. The two answers "strongly agree" and "agree" were combined in a single positive answer. The answers "strongly disagree" and "disagree" were also combined into a single negative answer. The one answer left, "undecided," was retained as a third possible answer. The mean scores represented the full scale from 1 to 5. However, to interpret the mean scores in keeping with the compressed scale; agree, neutral and disagree, the following applies:

The answer "agree" is reflected in a mean score of two and less. The mean score of three represents the undecided and the answer "disagree" is reflected in a score of four or higher. Appendix D displayed the perception of the respondents towards computer utilization with the original scale.

Table 11 lists the frequencies and the percentages of the total population regarding the computer impact and use in Algerian universities. From the results shown in this

table, it appears that 61.5 percent of the respondents did not share the idea that the computer is a luxury for the Algerian society. Also, 62.1 percent rejected the idea that the computer is a luxury for the university. However, 19.6 percent of the individuals did perceive the computer as a luxury for the society. Almost the same percentage (21.5 percent) perceived the computer as not being a necessary tool for the university. The computer also was considered by others as an urgent need. Out of 107 respondents 73 believed that a computerized system for the registrar, and student affairs and enrollment is an urgent need. This represents 68.2 percent of the entire population. Only a small percentage (6.5 percent) disapproved of the idea.

Over half of the respondents reacted negatively to both statements "the computer is a luxury for our society" and "computer is a luxury for our university." About 20 percent of the sample believed that the computer is indeed a luxury. The remaining respondents, 13.1 percent, were undecided.

The results also demonstrated that in the overall perception of computer utilization, a small percentage (less than 19 percent) represented the undecided respondents. Concerning computer assistance in solving the university's problems, 55.4 percent responded positively, 11.2 percent opposed the statement and 18.6 percent were undecided. It should be noted that the remaining percentage

which was not reported concerned the respondents who did not answer.

Table 11

Perception of Respondents Towards Computer Utilization (Responses to Questionnaire Items 20-30)

Items N	Perception toward the computer	Yes		No		Und	
		N	%	N	%	N	%
20.	Luxury for the society	21	19.6	68	61.5	14	13.1
21.	Luxury for the university	23	21.5	67	62.1	14	13.1
22.	Student records	95	88.8	7	6.5	4	3.7
23.	Personnel records	85	79.4	10	9.3	10	9.3
24.	Computerized scheduling	78	72.9	12	11.7	13	12.1
25.	Computer in library	87	87.0	8	7.5	8	7.5
26.	Urgency for a computer	92	86.0	2	8.4	9	8.4
27.	Computer assistance in university management	65	60.7	20	18.7	17	15.9
28.	Advantages of a computer	78	72.9	12	11.2	11	10.3
29.	Computer and university problems	70	55.4	20	18.6	12	11.2
30.	Computerization and reorganization	71	66.3	12	11.2	20	18.7

In general, individuals responded favorably to computer utilization in the university affairs whether they were for student records (88.8 percent), personnel records (79.4 percent), scheduling (72.9 percent), library

(81.3 percent) or for management (60.7 percent). Other applications were reported such as computer assisted instruction, use in control process, demographic census and other discipline-oriented uses.

The tables which follow present the results of the analysis of variance of the attitude items with regard to the groups of the study. The means and standard deviations are also displayed. The attitude items run from item number 20 to 30 inclusive in the survey questionnaire (Appendix A). The results which follow are concerned with the six hypotheses formulated in this study.

Before any further analyses are reported, It should be noted that items number 26, 28, and 29 were designed in the negative form. Thus, in table 12, for example, the mean scores reported for the item number 26 are 3.91 for instructors and 2.78 for administrators. The mean score of 3.91 is in fact a negative answer, but since the item was designed in a negative form, the negative answer in this instance 3.91 applies a positive perception to the statement. The same principle applies to the other items (26, 28 and 29).

Null Hypothesis One: With respect to null hypothesis one, which stated, "there is no significant difference between the perceptions of administrators and instructors toward computer utilization" the following results were obtained:

The results reported in Table 12 confirmed that there existed a significant difference in the attitudes of administrators (N = 23) and instructors (N = 79)

Table 12

Differences in the Perception Between Administrators and Instructors Toward Computer Utilization (Teachers "N = 79" and Administrators "N = 23")

Item N	Perception toward the computer	Instructors Mean	SD	Administrators Mean	SD
20.	Luxury for the society	3.77	1.46	3.17	1.99
21.	Luxury for the university	3.81	1.58	3.34	1.94
22.	Student records	1.43	0.90	1.52	1.20
23.	Personnel records	1.75	1.23	1.17	0.93
24.	Computerized scheduling	1.81	1.16	1.69	1.63
25.	Computer in library	1.63	1.05	1.73	1.07
26.	Urgency for a computer	3.91	1.29	2.78	2.15
27.	Computer assistance in the university management	2.48	0.84	1.91	0.51
28.	Advantages of computers	4.21	1.32	3.21	2.19
29.	Computer and university problems	3.89	1.41	3.08	2.10
30.	Computerization and reorganization	2.06	1.27	1.21	1.12

Differences in means between the two groups of administrators and instructors were significantly different

with respect to the statements number 26, 27, 28, 29 and 30. The nature of the differences is explained below in the ANOVA analysis. The scores of instructors were more homogeneous than those of the administrators with regard to statements such as items numbers 28 and 29. The standard deviations corresponding to these statements were higher for administrators than for instructors. This indicated a high variance among administrators.

The research hypothesis stating that administrators perceive computer utilization in the university more favorably than do instructors was partially retained for further analysis.

Table 13 reports the analysis of variance for the statement "computer utilization is important but it is not the right time to think about it" by type of occupation (administrators and instructors). The analysis of data indicated that a significant difference existed between administrators and instructors with respect to the above statement with an ($F = 5.36$, $p < .01$.

Comparison between the means of the two groups indicated that instructors (Mean = 3.91) believed more than administrators (Mean = 2.78) that it was time to consider computer use. These means also indicated that both administrators and instructors reacted favorably to the statement.

Table 13

Difference between Administrators and Instructors' Reaction to the Statement "Computer Utilization is Important but it is Not the Right Time to Think About it"

Source	DF	SS	MS	F
Between	2	6.34	3.17	5.35 *
Within	104	61.54	.59	
Total	106	67.88		

* Significant beyond p <.01

The instructors tended toward the "undecided" answer, whereas the administrators' answers were clearly positive.

The results of the analysis of variance displayed in table 14 show a significant difference between administrators and teachers with regard to the statement "computer contributes in the improvement of the management of the univerity" with an F = 5.24, p <.01. Further analysis of the means of the two groups indicated that instructors (Mean = 2.48) perceived computers as important, and as urgent, more than administrators did (Mean = 1.91). However, administrators and instructors both reacted positively to the statement "the computer contributes in the improvement of the management of the university."

Table 14

Difference between Administrators and Instructors' Reactions to the Statement "Computer Contributes in the Improvement of the Management of the Univerity"

Source	DF	SS	MS	F
Between	2	22.59	12.05	5.24 *
Within	104	239.09	2.29	
Total	106	263.19		

* Significant beyond p <.01

Table 15 presents the analysis of variance of administrators and instructors with respect to the statement "the computer does not offer any advantage." The data indicate a significant difference between the two groups with ($F = 4.83$, $p < .01$). Instructors perceived more advantage than administartors did, indicating a mean of 4.21 for instructors and 3.21 for administrators.

Table 15

Difference between Administrators and Instructors' Reactions to the Statement "Computer Does Not Offer any Advantage for the University"

Source	DF	SS	MS	F
Between	2	22.59	11.29	4.83 *
Within	104	239.09	2.33	
Total	106	265.85		

* Significant beyond $p < .01$

The data reported in Table 16 indicate a significant difference between administrators and instructors with respect to the statement "the problems of the management of the university do not have anything to do with computers" ($F = 3.52$; $p < .05$). A comparison of the means of each group

showed that administrators (Mean = 3.89) were more favorable to computers than were instructors (Mean = 3.08). Administrators and instructors disagreed with the statement "the problems of management of the university do not have anything to do with computers" and consequently they perceived computers as having more advantage to solve the university problems. Null hypothesis one was then rejected under this consideration.

Table 16

Difference between Administrators and Instructors' Reactions to the Statement "The Problems of Management of the University Do Not have Anything to Do with Computers"

Source	DF	SS	MS	F
Between	2	17.34	8.67	3.52 *
Within	104	255.81	2.45	
Total	106	273.15		

* Significant beyond p <.05

The analysis of variance shown in table 17 presents a significant difference between administrators and instructors' reactions to the statement "the use of computers in managing our university requires a systematic reorganization" with F = 4.83, p <.01. The comparison of the two groups' means indicates that administrators (Mean =

1.21) were more favorable to the reorganization of the university when computerization was considered than were instructors (Mean = 2.06). The means scores show that both groups were favorable to the above statement.

Table 17

Difference between Administrators and Instructors' Reactions to the Statement "The Use of a Computer Requires a Systematic Reorganization of the University"

Source	DF	SS	MS	F
Between	2	22.59	11.29	4.98 *
Within	104	239.09	2.33	
Total	106	265.85		

* Significant beyond p <.01

Null Hypothesis Two: With respect to null hypothesis two, which stated "there is no significant difference between instructors in the field of Hard Sciences from those affiliated with Humanities and Social Sciences regarding their perception towards computer utilization," the following result was obtained:

In order to test this hypothesis, an analysis of variance was performed. The F values do not show any significant difference between instructors from hard sciences and instructors from humanities and social sciences at either .01 level or.05 level. This result, therefore,

clearly supports the above null hypothesis, and thus, there is no significant difference between the perceptions of instructors from different fields toward computer utilization in the university.

From table 18 one can observe a high variance between instructors. For example, with respect to item 25

Table 18

Differences in the Perceptions of Instructors Toward Computer Utilization by Type of Field (Humanities and Social Sciences Versus Hard Sciences)

Item N	Perception toward the computer	Hum & So.Sciences N = 47 Mean	SD	Exact Sciences N = 40 Mean	SD
20.	Luxury for the society	4.00	1.26	3.55	1.66
21.	Luxury for the university	3.89	1.47	3.82	1.72
22.	Student records	1.51	0.95	1.32	0.85
23.	Personnel records	1.80	1.20	1.57	1.21
24.	Computerized scheduling	1.97	1.29	1.77	1.18
25.	Computer in library	1.48	0.88	1.67	1.16
26.	Urgency for a computer	3.89	1.22	3.97	1.44
27.	Computer assistance in the university management	1.46	0.77	1.40	0.87
28.	Advantages of computer	4.27	1.24	4.32	1.34
29.	Computer and university problems	3.93	1.40	4.02	1.36
30.	Computerization and reorganization	2.10	1.38	1.87	1.06

instructors' scores from humanities and social sciences (SD = .88) were more homogeneous than instructors from exact sciences (SD = 1.16).

Null Hypothesis Three: With respect to null hypothesis three, "there is no significant difference between the perception

Table 19

Differences in The Perception of Computer Utilization by Level of Education Completed

Items N	Perception toward The computer	Low Edu Level Means	SD	High Edu Level Means	SD
20.	Luxury for the society	3.18	1.86	3.93	1.41
21.	Luxury for the university	3.33	1.86	3.95	1.51
22.	Student records	1.36	1.02	1.45	0.92
23.	Personnel records	1.36	1.89	3.95	1.51
24.	Computerized scheduling	1.48	1.44	1.68	1.21
25.	Computer in library	1.51	1.34	1.93	1.25
26.	Urgency for a computer	3.21	1.99	3.89	1.30
27.	Computer assistance in the university management	1.42	1.17	1.54	0.99
28.	Advantages of computer	3.57	1.95	4.24	1.35
29.	Computer and university problems	3.39	1.95	3.93	1.40
30.	Computerization and reorganization	1.30	1.10	2.08	1.26

of the high educational levels group and the perception of those with low educational levels regarding computer utilization", when tested, the following results were obtained.

Null hypothesis three concerned two groups with different educational levels. The first group represented four educational levels combined (the primary level, the junior high level, the high school level, and the post secondary level. The second group represented the graduate level. Table 19 illustrates the results of the means and standard deviations of the perception scores. With the exception of item 30, the group of low educational level showed considerable variance. This finding indicated that this group was characterized by a low homogeneity. From the following tables, it is indicated that there was a significant difference in the following attitude items: number 20, 27, 28, and 30.

Table 20 presents the analysis of variance of the reactions of groups with the different educational levels to the statement, "the computer is a luxury for our society" ($F = 5.24$, $p < .05$). An examination of the means of the two groups showed that, although neither group believed that the computer is a luxury for the Algerian society, the degree of difference in disagreement with this statement was stronger in the group with higher educational level (Mean = 3.93)

than the group with a lower educational level (Mean = 3.18). The answers from both groups, however, were positive. The statement that respondents with a high educational level perceived computer utilization more favorably than those with a lower educational level, was partially retained.

Table 20

Difference in the Percetion of Respondents by Educational Level with Respect to the Statement "The Computer is a Luxury for our Society"

Source	DF	SS	MS	F	
Between	1	12.85	12.85	5.24	*
Within	105	257.57	2.45		
Total	106	270.42			

* Significant beyond p <.05

The analysis of variance showed in Table 21 indicated a significant difference between the educational level groups with respect to the statement "The computer is important, but it is not the right time to think about it" (F = 10.54, p <.05). The means of the two groups indicated that the group with the lower educational level (Mean = 3.21) was more favorable to the idea of considering computers now than the group with the higher educational level (Mean = 3.89).

While the ANOVA analysis shows a significant difference, the means, however, indicated a clear disagreement with the statement from both groups of educational levels.

Table 21

Difference in the Perception of Respondents by Level of Education Completed "The Computer is Important, but it is Not the Right Time to Think about it"

Source	DF	SS	MS	F
Between	1	10.54	10.54	4.38 *
Within	105	252.65	2.40	
Total	106	263.19		

* Significant beyond p <.05

The analysis of variance presented in Table 22 indicated a significant difference between the two groups of educational levels with regard to the statement "then computer does not offer any advantage to Algerian universities" (F = 4.17, p <.05). The means of the two groups indicated that the group with a higher educational level (Mean = 3.57) perceived more advantages of computers for the university than the group with a lower educational level (Mean = 4.24). Null hypothesis three was then not supported by this result. This finding also indicated that

while both groups did not agree with the above statement, and it was apparent from the means that both groups reacted negatively, the lower educational group tended to disagree more strongly than did the higher educational group.

Table 22

Difference in the Perception of Respondents by Educational Level with Respect to the Statement "Computer Does not Offer any Advantage to our University"

Source	Df	SS	MS	F
Between	1	10.16	10.16	4.17 *
Within	105	255.68	2.43	
Total	106	265.85		

* Significant beyond p <.01

The analysis of variance reported in Table 23 indicated a significant difference between the two educational groups with respect to the statement "the use of computers in managing our university requires a systematic reorganization of the university" (F = 9.27, p <.01). An examination of the means of the two groups showed that the group with the lower educational level (Mean = 1.30) reacted more favorably to the statement than did the group with the higher educational level (Mean = 2.08). However, a close

examination of the means indicated that both groups were favorable to the statement.

Table 23

Difference in the Perception towards Computer Utilization by Levels of Education Regarding the Statement " The Use of Computers in Managing our University Requires a Systematic Reorganization of the University"

Source	DF	SS	MS	F
Between	1	13.81	13.81	9.27 *
Within	102	156.48	1.49	
Total	106	170.29		

* Significant beyond p <.01

Null Hypothesis Four: With respect to nullhypothesis four, which stated that there is no significant difference between the perceptions of instructors and administrators graduated from local institutions and those graduated from foreign schools regarding computer utilization, the following results were obtained.

From the data displayed in Table 24, the means and standard deviations of the two groups of instructors and administrators may be observed. There was a high variance among instructors regarding statement number 27.

Instructors from national schools showed a high standard deviation which meant that the group in question

Table 24

Differences in the Perception of Respondents towards Computer Utilization of Respondents by Type of Schools "National Schools and Foreign Schools"

Item N	Perception toward the computer	National Sc Mean	SD	Foreign Sc Mean	SD
20.	Luxury for the society	3.39	1.72	4.39	1.01
21.	Luxury for the university	3.56	1.74	4.20	1.26
22.	Student records	1.41	0.87	1.47	1.10
23.	Personnel records	1.58	1.16	1.70	1.26
24.	Computerized scheduling	1.64	1.25	2.14	1.32
25.	Computer in library	1.52	1.06	1.47	1.02
26.	Urgency for a computer	3.50	1.67	4.05	1.27
27.	Computer assistance in the university management	1.77	0.73	1.47	0.92
28.	Advantages of computer	3.91	1.69	4.29	1.29
29.	Computer and university problems	3.78	1.29	1.97	1.23
30.	Computerization and reorganization	1.78	1.29	1.97	1.23

demonstrated a low homogeneity. The same finding applied to statement number 20 (Table 24). The ANOVA results did not support the research hypothesis pertaining to the differences in the attitudes between the respondents who

graduated from local institutions and those who graduated from foreign institutions.

Using the analysis of variance only one significant difference made the exception between the two groups. As it is shown in Table 25, the statement concerned was, "the computer is important, but it is not the right time to think about it" ($F = 8.92$, $p < .01$). A comparison of the means of the two groups demonstrated a strong difference in the degree of disagreement between individuals who studied in local institutions (Mean = 3.50) and those who studied in foreign institutions (Mean = 4.05). In other words, both groups believed that the computer is important and that the time was right to consider it.

Table 25

Difference in the Perception between Instructors from Humanities and Social Sciences versus Instructors from Exact Sciences regarding the Statement "Computer is Important, but it is Not the Time to Think About it"

Source	DF	SS	MS	F
Between	1	21.18	21.18	8.92 *
Within	105	249.24	2.37	
Total	106	270.42		

* Significant beyond $p < .01$

Null hypothesis four was partially retained with respect to the above statement.

Null Hypothesis Five: With respect to null hypothesis five, which stated "there is no significant difference in the perception between administrators and faculty members who had a computer experience and those who did not," the following results were obtained.

Table 26 presents the means scores of the individuals who had computer experience and those who did not. The only significant difference that was found concerned the item "computerization of personnel records is a necessity" ($F = 4.38$, $p < .05$).

The individuals with computer experience (Mean = 1.23) were more favorable to the idea of computerization of personnel records than those who did not have any computer experience (Mean = 1.84). This difference reflected the extent of the disagreement of these two groups.

The results as shown in Table 26 indicated that while only one significant difference was found, a close examination of the groups' means showed generally positive perceptions of the groups with computer experience and those without computer experience. This finding supported null hypothesis six.

Table 26

Differences in Perception between Those Having Computer Experience and Those Not Experienced

Item N	Perception toward the computer	Exp N=49 Means	Not exp N=58 Means	F
20.	Luxury for the society	3.81	3.60	0.46
21.	Luxury for the university	3.93	3.62	0.97
22.	Student records	1.24	1.58	3.48
23.	Personnel records	1.36	1.84	4.38
24.	Computerized scheduling	1.87	1.74	0.29
25.	Computer in library	1.36	1.62	1.55
26.	Urgency for a computer	3.71	3.65	0.03
27.	Computer assistance in the university management	1.30	1.36	0.28
28.	Advantages of computer	4.13	3.96	0.25
29.	Computer and university problems	3.95	3.60	1.30
30.	Computerization and reorganization	1.83	1.84	0.00

Null Hypothesis Six: With respect to null hypothesis six, There is no significant difference between the perception of administrators and instructors who demonstrated a willingness to learn about computers and those who did not, the following results were obtained:

Table 27 indicates the direction of the perceptions of the individuals who demonstrated an interest in learning about computers and those who did not.

Table 27

Differences in the Preception toward Computer Utilization between Those Expressing Computer Interest and Those Not Expressing Computer Interest

Item N	Perception toward the computer	Interested N=75 Mean	not interested N=10 Mean	F
20.	Luxury for the society	3.66	4.10	0.59
21.	Luxury for the university	3.84	4.20	0.40
22.	Student records	1.30	1.80	2.49
23.	Personnel records	1.50	2.50	6.38
24.	Computerized scheduling	1.70	1.90	0.20
25.	Computer in library	1.48	1.70	0.37
26.	Urgency for a computer	3.70	3.40	0.31
27.	Computer assistance in the university management	1.29	1.30	0.00
28.	Advantages of computer	4.13	3.00	4.46
29.	Computer and university problems	3.86	3.20	1.49
30.	Computerization and reorganization	1.78	2.00	0.24

The analysis of variance performed for this purpose showed a significant difference between the two groups with regard to two items. The first item "computerization of personnel records is a necessity" yielded an F value of 6.38 $p < .05$. The second item "the computer does not have any advantage for Algerian universities" showed an F value of 4.46 $p < .05$.

The mean scores of the two groups (individuals who demonstrated a willingness to learn about computers and individuals who did not) indicated that the interested individuals (Mean = 1.50) were more favorable to computerization of personnel records than individuals who were not interested (Mean = 2.50). Both groups were positive about using a computer at Algerian universities.

With respect to the second item "the computer does not have any advantage for Algerian universities," the interested group (Mean = 4.13) disagreed more strongly than did the individuals who were not interested (Mean = 3.00). It should be mentioned also that the second item was administered in a negative form. The corresponding items describe the tendency of this difference. They show a favorable attitude among the group who manifested a willingness to learn about the computer.

The Perceived Impact of Computers

Regarding the question related to the issue of the negative and positive impacts of computers on Algerian universities as perceived by administrators and instructors, the following is a summary of their answers:

The Negative Impact:

1. Risk of importing a model which does not take into account the proper local requirements.

2. Risks of resistance to the use of computer, due to the absence of a tradition in the automated services.

3. Risk of illegal use and abuse of personal information.

4. Risks of laying off personnel.

The Positive Impact:

The positive aspects of computerization were also substantiated. These are presented in the following conclusions.

1. Saving time and energy in managing the administration's activities with special reference to routine tasks.

2. Precision and accuracy of the results.

3. The ability to use and to access the central computer facilities by all institutes.

4. Saving money.

5. Reduce hidden employment e.g., problems related to

overstaffing.

6. Rationalization of tasks.

7. Flexibility of the computer uses.

Additional Findings

Perception of Administrators Toward Computer Utilization with Respect to their Positions

Administrators were classified into two groups: administrators with managerial positions, and administrators performing clerical tasks. The analysis of variance and comparison of group means were examined. Table 28 indicates the F value of the attitude items scores against the two groups of administrators. Significant differences at the .01 and at .05 levels were found between administrators who held routine jobs and administrators who held supervisory or management positions. The attitude items numbers 20, 21, 26, 27, 28, and 29 are those that show a significant differences. Administrators who performed routine jobs believed that the computer was a luxury for the Algerian society more than administrators who held supervisory positions ($F = 4.84$, $p > .05$). Again, administrators who performed routine jobs believed that the computer was also a luxury for the university more than administrators who performed a supervisory tasks ($F = 6.26$, $p < .01$). A significant difference was also found between the two groups

Table 28

Differences in the Perceptions Toward Computer Utilization by Two Levels of Administrators

Item N	Perception Toward the computer	Clerical Means	SD	Managerial Means	SD	
20.	Luxury for the society	2.58	2.23	4.13	1.40	**
21.	Luxury for the university	2.66	2.14	4.33	1.29	*
22.	Student records	1.66	1.43	1.26	0.79	
23.	Personnel records	1.33	1.30	1.20	0.77	
24.	Computerized scheduling	1.33	1.77	2.13	1.50	
25.	Computer in library	1.00	1.34	1.26	0.59	
26.	Urgency for a computer	1.66	0.49	2.13	3.50	*
27.	Computer assistance in the university management	1.75	2.13	3.93	1.48	*
28.	Advantages of computer	2.08	2.31	4.60	1.05	*
29.	Computer and university problems	2.33	2.34	4.13	1.35	*
30.	Computerization and reorganization	1.00	2.34	1.40	0.73	

* significant beyond <.01
** significant beyond <.05

of administrators with regard to the statement "computer utilization is important but it is not the right time to think about it" (F = 14.16, P < .01). Consequently,

supervisory administrators were more favorable to the computer with respect to its urgency than were clerical administrators. The results also indicated that administrators with routine jobs believed that the computer has less advantages than did the other group of administrators. Also, administrators with managerial tasks were more favorable to the computer use in solving the problems of the university than did administrators who performed routine tasks.

In conclusion it is apparent that administrators with supervisory tasks were more favorable to computer utilization than administrators who held routine jobs, with respect to the items mentioned above. With the exception of item number 26, administrators who did clerical tasks showed a considerable variance (table 28). This finding demonstrated a low homogeneity among the group with the lower educational level (the administrators who did clerical tasks).

Instructors' Perception Toward Computer Utilization with Respect to their Positions

Table 29 lists the composite means, the standard deviations and the F values for the 11 items of computer attitudes, against instructors' positions. These positions are Professor, Maitre de Conference, Maitre Assistant, Assistant Stagiaire, and Assistant Contractuel.

The results showed only one significant difference among instructors (p <.05). The concerned statement is "class

Table 29

Differences between Instructors Perception Towards Computer Utilization by Academic Positions

Item N	Perception toward the computer	Composite means	SD	F
20.	Luxury for the society	3.84	1.43	0.85
21.	Luxury for the university	3.90	1.55	1.27
22.	Student records	1.43	0.91	0.68
23.	Personnel records	1.73	1.22	1.79
24.	Computerized scheduling	1.89	1.24	2.87 *
25.	Computer in library	1.58	1.02	0.80
26.	Urgency for a computer	1.44	0.82	1.88
27.	Computer assistance in the university management	3.95	1.28	1.06
28.	Advantages of computer	4.27	1.28	1.55
29.	Computer and university problems	3.96	1.38	1.06
30.	Computerization and reorganization	1.98	1.25	3.01 *

Significant beyond p <.05.

scheduling requires the assistance of computers." The result of the Scheffe test indicated that the existing differences between groups concerned the two groups, Tenured

Assistant and Associate Professor (Maitre Assistant and Maitre de Conference). Tenured Assistants (Mean = 2.36) were more favorable to the use of computers in class scheduling than the group of Associate Professors (Mean = 1.28).

The ANOVA analysis indicated that a significant difference was found regarding the statement "the use of computers in managing Algerian universities requires a systematic reorganization of it." The Contract Assistants (Mean = 1.00) were more favorable to the above statement than the Tenured Assistants (Mean = 2.25) and the Associate Professors (Mean = 2.52). These means also showed that responses from all these groups were positive.

The F value of the statement number 30 showed a significant difference at .05 level between the groups of instructors by academic positions. Contract Assistants (Mean = 1.00) were more favorable to the statement than the Tenured Assistants (Mean = 2.25) and Associate Professors (Mean = 2.52). However, a close examination of the means indicated that all the three groups reacted positively to the statement, and consequently they perceived reorganization of the university as necessary, before considering further computerization.

Section Two

Identification of the Major Administrative Problems

From the interviews and the visitation notes in different institutes and offices of the university, the administrative problems at the university under study could be classified, for the purpose of the analysis, into two categories. First those issues related to student affairs and student enrollment in general. The second category of problems involves personnel affairs (instructors and staff support).

One general observation underlying a common facet of these problems represented the nature of administrative services. It was reported that the functioning of the university was plagued by slow, and ineffective services. Almost all the difficulties perceived as potentially to be alleviated by computer assistance were either routine tasks or involved the manipulation of large and complex data. Six of the interviewees believed that informatics could be the cure for most of the on-going administrative problems. As one instructor stated:

> Due to the growing number of students and also due to the reform of student progression, computer stands as the only way to solve the problems of different services..., in order to follow up and update the student and personnel files, computerization is more than necessary in this university."

Three of the individuals could see no significant impact from computerization. They argued that the real issue facing Algerian universities must be approached in terms of human and organizational support. Computerization according to them could create no more than a duplication of the existing problems in a "new automated failure."

Problems of Student Enrollment

Algerian universities involve an extensive administrative process, including admissions, registration, student enrollment and progression, as well as the promotion of scholarship and housing. The most disturbing problem which received equal attention from all interviewees was the systematic dependence of the actual system on inappropriate paper work handling. It was reported that information was duplicated in several forms to serve the needs of the various departments of the institute or the admission office and many other services.

The difficulties found in the domain of student enrollment were reflected in the following areas: Student admission and record keeping, class scheduling, and grade reporting.

Processing Admissions and General Student Records. On-going problems were reported to be manifested in each school year. One example is the admission of new students which is becoming a "traditional festival." Endless hours and a

great deal of energy were consumed in routine clerical work. Almost all university administrators, including the offices of the deans and heads of departments, were mobilized during the period of registration. A new student with little available information, in order to get help, must run from office to office. An information center to assist and orient students, for the most part did not really exist. New students were asked to present three separate sets of documents to the Central Admission Center, scholarship office and housing office. The total number of items requested from students exceeded twenty items of documentation. A significant reduction of these requirements could be achieved by a simple coordination between the concerned services and easily solved by computerization.

Heads of departments or directors of institutes were always under pressure to keep things functioning with minimum conflict.

In many cases, documents have been misplaced or disappeared from the student files. As one faculty member stated "the manual system as it is operating now cannot provide a continuous and updated follow up of student enrollment." Problems can settle down at the bottom of the file until student faces a new situation where a checking of the file is then required. Therefore, the problem of organization and classification of files is a real.

Grade Records. The courses required for a certain degree are assigned according to the educational progress of the student towards his or her degree requirements. The total course load for a specific degree is distributed across each semester. Three or four courses are usually scheduled for a given semester. The student cannot take the courses scheduled in the second semester unless he or she satisfies the academic requirement of courses in the first semester and so on. Moreover, the complexity of grade reports processed each semester by the faculty showed a great deal of upset. The system operates under heavy educational procedures which usually irritates students as well as personnel and academicians. Instructors are required to report in a general meeting the final grades of each course and manually or with the use of calculators compute the average for each student's grades. These various examples underscore how faculty members and heads of departments are involved in a series of sterile activities which should be, in normal circumstances, a part of the administration process. They are asked to spend considerable time in reporting, correcting and computing grades. This reduces the time which would otherwise be allocated to more important meaningful teaching and research activities.

Class Scheduling. The difficulties with regard to the reporting of class scheduling are manifested in the delays

at the begining of classes, and the inappropriate assignment of classrooms within certain parameters (morning and evening sessions and instructors preferences for teaching times).

Personnel Administrative Problems

Most of the problems related to personnel were reported by individuals as follows:

- Promotion delays and difficulties and personnel status updating.
- Mismanagement of official personnel documents.
- Ineffective transactions of personnel documents
- Delay in personnel payroll processing.

One of the problem which considerably irritates instructors and staff support is the chronic deficiency in the payroll system. As one interviewee explained "it is rare to find any instructor or staff member who did not have a problem of some kind with the payroll services at one time or another."

It is not relevant to this study's objective to investigate the complex reasons behind this problem but it should nonetheless be emphazized that the university's administrative machinery performance is mostly criticized as being very "bureaucratic." Bureaucracy, as understood here, is used in the sense of much exaggerated paper work which breaks down the functions of administration and freezes its dynamism. This problem, however, is not a special problem

of the university alone but it is rather a phenomenon of the Algerian maladministration.

Computer Capability:

Computers are managed by the Computer Center (Centre de Calcul) since 1974, the University of Oran has been using a Mitra 15/35, a French computer with a very limited capacity of 32 k and 5 MB magnetic tape. The computing center had besides the magnetic tape unit (400 lines /mn), a printer, and a card reader (300 lines /mn). It was not until 1985 that the university was given a relatively modern equipment. The computing center includes now, in addition to its Mitra, another important medium-sized computer (Vax 782). On the other hand, the new Institute of Computer Science obtained in the fall of 1985 five microcomputers (Olivetti 360-640k with 10 MB hard disk single drive). This allowed the institute to have its own computer facilities. The actual equipment, however, was viewed as being underused. One instructor explained by saying that

> Computer equipment available at the university is insufficient, but it is also badly managed. The actual computer facilities could have high rate of utilization if they were better planned.

Computing at the University

The University of Oran, like other universities in the country, did not have a comprehensive computing plan. Informatics in Algerian universities, as the report of the Ministry of Higher Education noted, was undefined and vague at best. The computing center was the only center available for computing tasks.

In spite of the limited capability of the existing single computer (Mitra 15/35), the small faculty community in informatics became involved in major activities. These activities included hands on experience and teaching. The computer provided also its facilities for the few students who were conducting their own research.

The most challenging single project involved informatics faculty members in their design of electronic student files. This was limited to the Institute of Exact Sciences which is constituted of the departments of Mathematics, Chemistry, Physics, Informatics, and Core Courses. The purpose of this ambitious project was to computerize the files of students enrolled in those departments.

The University Experience of Computerized Student Records

As mentioned above, the Computing Center, with the assistance of the Institute of Exact Sciences, initiated a

project of computerized student files. The software system was developed locally (Figure II).

The general structure of the system designed, dealt with the following activities:

1. Creating a new student file from the individual information form.
2. Requesting changes of information.
3. Entering of courses from the registration sheet in each semester.
4. Listing student profiles of enrollment.
5. Editing lists by courses or by major or both.
6. Editing the report of the core courses (Tronc commun).
7. Checking data files with the grades and information report.
8. Retrieving files from the archives.
9. Saving the files of graduating students in the archives.
10. Listing students.

The file of each student contained information from different sources namely the individual's information form, the admission form, and the grades report for each semester.

The admission form contained information such as institute, student I.D number, major, semester number and course number. The individual's information form contained a set of demographic data elements related to the student

such as name, date and place of birth, sex, address, and so on. The other type of data related to the educational background of the student and his or her progression throughout a given program. All the information were converted into the form of punched cards. At the end of each semester the grades were reported and stored in the student's master file. The system was able to sort students data by major or alphabetical order or school year. The grade report consisted of data such as number of semesters, course number, last registration, date of last registration, state of each course, number of failures in a given course and the grade average.

According to the person in charge of the computing center and one of the participant in the design of the system, this experience can be expanded to cover all university students if the hardware capability can be provided.

The use of the system was very limited. Among the factors behind this, is that the computing center was isolated in a separate building which was remotely located from the institute of exact sciences. Another factor represented as lacking in the system was the inability to use online access. The Institute of Exact Sciences, given its relatively remote location from the Computing Center, and given the inability of the system to use online access, was unable to utilize the system fully. It is important to

mention also that the system did not have any applications for the administration, such as admission office (Central Admission Center) or Secretariat General. This project is considered an exercise that can be expanded to the rest of the institutes of the university.

Computer Human Resources at the University

Technology by itself does not improve higher education in ways that improve the quality and effectiveness of students (Van Horn, 1985:6). Specialists in the domain of computers and information systems are the basic needs to promote the computers use in higher education.

The Institute of Informatics or Computer Science became independent at the begining of the year 1985-86. The institute employed about 26 instructors, of whom half were foreign academicians. The informatics plan (1984) estimated that by the year 1988-89 the Institute of Informatics at the University of Oran will have the same number of instructors and will be self-sufficient. This vision is inadequate, for the simple reason that half of the teachers are foreigners, and the policy of the "algerianization" i.e., progressive replacement of foreign academicians by competent nationals, demonstrates the estimated needs which is to be 50 percent of the actual number of teachers.

The computing center of the university is still assisted by a foreign instructor. More than half of the

informatics instructors working at the university are assistants (engineers). This represents a real problem of the shortage in computer professionals and qualified instructors at the university.

With regard to computer literacy for administrators, an attempt was made to introduce computerization during the summer vacation. An Atari microcomputer was brought in by an academician and was used for this purpuse. It was noticed that the voluteer administrators were very enthusiastic about the initiation. However, in spite of the program's weaknesses in terms of preparation and planning, it would have been a good first step if it has been carried through.

The Algerian Computing Profile:

Information was presented throughout this chapter regarding the nature of computer readiness of administrators and instructors. The extent of computer use, as well as the computing capabilities were examined. From these data the following computing profile can be suggested, taking into consideration the development model proposed by Robbins, et al., (1975).

In order to draw a comprehensive computing profile the four components are summarized. These components are 1) Technological capability, 2) Administrators and instructors perception, 3) Computer utilization and 4) Computer

specialists. The computing profile of Algerian universities could be described in the following development stages:

I. The Technological Capability:

I Initial Stage	II Basic Stage	III Operational Stage
1- Access to facilities.		
----------	Access to computer With or without ownership.	----------
2- Sources of information and intellectual expertise.		
----------	Few individuals in the University	----------
3- Hardware and Software development.		
----------	Little software development.	----------

II. Administration:

1. Attitudes towards computer operations.		
----------	----------	Administrators and instructors recognize many applications.
2. Perception of potential impact.		
----------	----------	Good perception of potential impact.

III. Uses of computing:

I Initial stage	II Basic stage	III Operational Stage
1. Faculty research.		
_____	Some faculty research limited to some departments.	_____
2. Student instruction.		
_____	_____	Education in computer science.
3. Administration.		
No use of computing for administrative operations.	_____	_____

IV. Computer human support.

1. Size of professional staff

I	II	III
_____	Computer staff are teachers in computer science.	_____

2. Control over activity.

_____	Control vested in an existing academic institute.	_____

Technological Capability: There is a little hardware and software development in Algerian universities. The access to computer facilities as well as the sources of

information, might be considered as being in the basic stage.

Perceptions Toward Computers:

Administrators and instructors perceived positively the role of computers in Algerian universities. They also recognized the impact of computers on university activities. These positive perceptions could be represented in the operational stage. This level of perception clearly represents the highest stage of development among all the other characteristics in the profile.

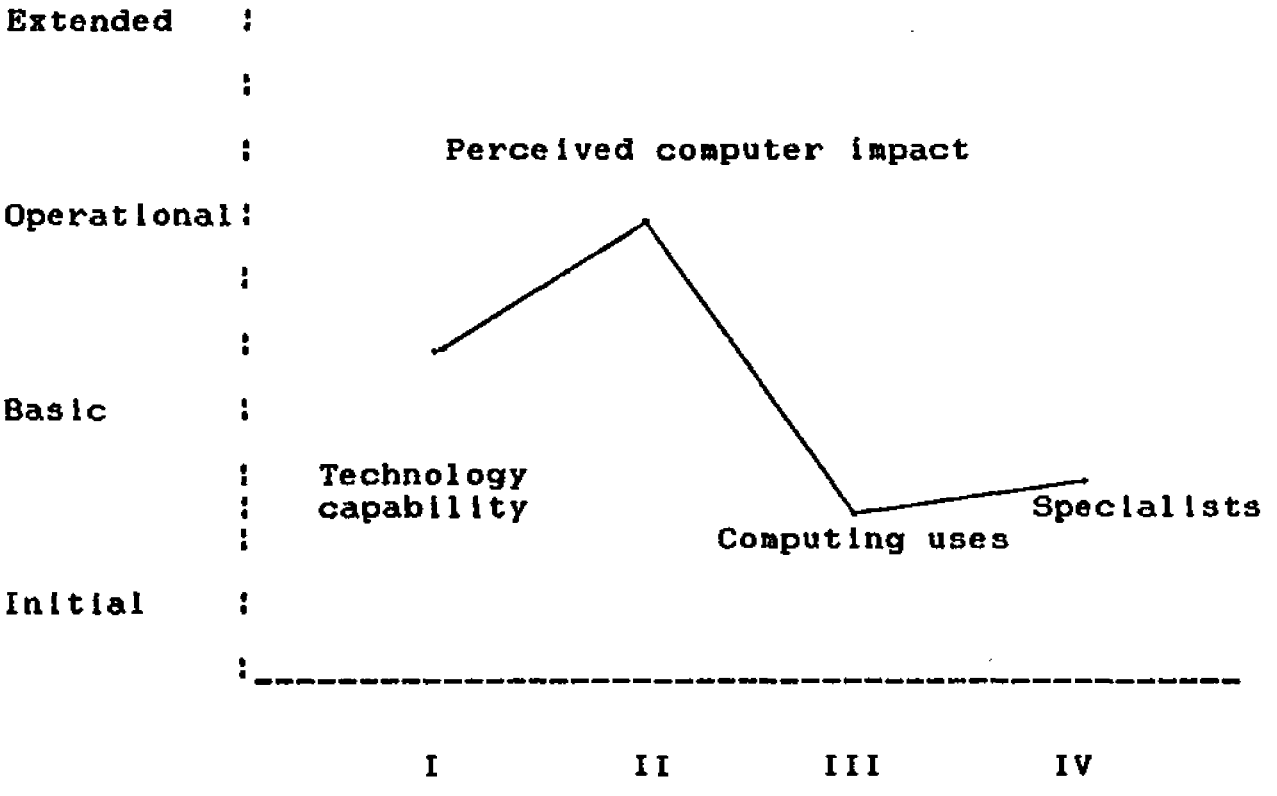
Computer utilization:

Computer uses involve many domains such as research, instruction and administration. The use of computers in research was found to be very limited, and it was reported that computers were mainly used for the purpose of computer science instruction, while the administration, was still operating on manual techniques. The extent of computer utilization, however, might be progressing from the initial stage to the basic stage.

Computer Human Support:

This component is perhaps the most important one because it is considered as the foundation of the other components. Unfortunately, the actual size and the expertise is very low. The reported data can be

characterized in the basic stage with a little progress towards the initial stage.



I = Technological capabilty, II = Attitude of administrators and faculty members, III = Uses of computing, IV = Professional computer staff.

Figure 1

A General Profile of Computing in Algerian Universities

Chapter Five

SUMMARY, CONCLUSIONS, DISCUSSION AND RECOMMENDATIONS

This chapter reviews the dissertation in a brief summary, followed by conclusions and a discussion of the findings. It also presents some recommendations derived from the findings of the study.

Summary

This study's basic purpose was to understand the general profile of the state of computing in Algerian higher education. First, an attempt was made to describe the nature of computer readiness among administrators and instructors of the University of Oran, and to test hypotheses related to the perceptions of these individuals toward computer utilization. Second, it was aimed at determining the existing capabilities in the domain of computer facilities, the extent of computer utilization, and the support of discipline-oriented computer specialists. A number of hypotheses and research questions were addressed in this study.

A set of comparisons between the perceptions of the groups was examined. These groups were 1) administrators versus instructors; 2) educational levels; 3) type of schools; 4) administrators' positions; and instructors' academic positions.

The research method adopted in this study incorporated visitation, interviews and questionnaire survey techniques. Subjects selected for this study were instructors and administrators employed in Algerian universities. A total of 107 questionnaire surveys were considered in the analysis of this study.

The questionnaire survey was developed to assess computer readiness, and was designed to solicit data in four main areas: a) Demographic data, 6 items; b) Computer awareness, 6 items; c) Computer interest, 7 items; and d) Perception toward computer utilization in universities, 11 items.

Nine interviews were conducted with high officials of the university, administrators and teachers. The interviews dealt with the following issues:

a) The administrative problems of Algerian universities.

b) The actual computing capabilities:

The extent of computing capability.

The extent of computer facilities.

The extent of human support capability.

Data analysis was performed on the Zenith Z200 PC, using the Statistical Package of Social Sciences (SPSS/PC). Descriptive statistics, which included frequencies, means and standard deviations were applied. Analysis of variance and comparison test procedures were also performed. In

order to compare the perception of groups under the study, the Scheffe test was applied.

Among the results indicated in this study, the following are presented:

Hypothesis one. With respect to H1," Administrators perceive computer utilization in university activities more favorably than do instructors," it was found that:

1. Instructors found more advantages to computer utilization in the university than did administrators. Both administrators and instructors perceived positively computers in the university. Hypothesis one was partially supported under the above considerations.

2. Administrators were more favorable to computer utilization in the management of the university than were instructors. Both groups reacted positively to the idea of bringing computers in the management of the university. This finding did partially support hypothesis one.

3. Instructors believed that the computer was urgently needed more than did the administrators. It was found also that both groups were favorable in their consideration that the computer was urgent. These results did not support the hypothesis.

It is clear from these results that significant differences between the perceptions of administrators and

instructors toward computer utilization in the university were not supported by this study.

Hypothesis two. With respect to H2, "Instructors from Hard Sciences are more favorable to computer utilization than instructors from the Humanities and Social Sciences," The results showed no siginificant difference between the two groups on all items. Hypothesis two was then rejected.

Hypothesis three. With respect to H3," Administrators and instructors with high educational levels have more favorable attitudes than those with low educational levels," the following results were found:

1. The group with the higher educational level which represents the graduate level, was more favorable to computer utilization in terms of its importance and its urgency to the university than the group with the lower educational level. Therefore hypothesis three was partially rejected.

2. The group with the lower educational level perceived the computer as a luxury tool in the Algerian society more than did the group with the higher educational level. Therefore, hypothesis three was partially retained.

3. The group with the higher educational levels perceived the computer as having more advantages than the group with the lower educational levels. Therefore, hypothesis three was partially retained.

Overall, these findings supported Hypothesis three.

Hypothesis four. With regard to H4, "Instructors and administrators graduated from local institutions have less favorable attitudes toward computers than those who graduated from foreign schools," it was found that the group graduated from local schools were more favorable toward computer utilization in the Algerian society than the group graduated from foreign schools. Thus, hypothesis four was definitely rejected.

Hypothesis five. With respect to H5, "Instructors and administrators who had computer experience have more favorable attitudes than those who did not," it was found that the group with computer experience were more favorable toward computer utilization for personnel records, than were the group with no computer experience. This difference showed the level of the groups' agreement. Both groups were favorably disposed to the use of computers for personnel records. On one hand, this finding partially supported hypothesis five. On the other hand, the hypothesis was rejected concerning other areas such as library uses, students' records, and scheduling. These results indicated that hypothesis five was not supported and consequently there was no significant difference in the perceptions of administrators and instructors with computer experience toward computer use at the university.

Hypothesis six. With regard to H6, "administrators and instructors who demonstrate a willingness to learn about computers have more favorable attitudes toward computer utilization than those who do not," the results indicated the following:

1. As was expected the group with computer interest was more favorable to computer utilization for personnel records than were the group with no computer interest. Therefore, hypothesis six was partially retained.

2. Advantages of the computer in Algerian universities: The group who were interested in learning about computers perceived more computer advantages than the group with no computer interest. Therefore, hypothesis six was also partially retained.

Thus, these findings did support hypothesis six.

Other findings can be summarized as follows:

1. Concerning the computer readiness of the respondents, the findings indicated that the level of computer experience was relatively low in Algerian universities. More than half of the respondents had never had any courses, workshops nor seminars of any kind about computers.

2. Of those subjects who were enrolled in informatics courses, only a few of them had used a computer.

3. Although the results revealed a lack of computer experience among administrators and instructors, their willingness to learn and work with computers was very high. Administrators and instructors who were interested in computers reported that they would like to use computers, in order of importance, for research activities, development of knowledge, programming, and word processing.

4. The finding indicated a positive predisposition of the majority of the respondents toward the acceptance of computer use in various university activities.

5. A series of problems have been facing Algerian universities. Difficulties were reported in student admission and enrollment, classroom and space use, personnel status updating and payroll, and records keeping.

6. In spite of the recent installation of the present computer facilities, their importance for administrative applications or for instruction and research purposes, were relatively perceived.

7. Basic software was developed at the university, but this is still at the embryonic stage.

Conclusions

Based on the findings of the data collected, the following conclusions were drawn:

1. Administrators and instructors had little experience in computer uses.

2. A clear definition of the role of the Algerian university places on computing was still vague and not well defined.

3. Administrators and instructors recognize the impact and use of computers in university activities and showed positive perceptions toward the installation of computers to assist in university activities.

4. There were no significant differences between the perception of administrators and instructors toward computer utilization.

5. In view of the results, the Algerian university's profile in computing is scattered across the first three stages, that is initial stage, basic stage and operational stage.

Discussion

This study provided some important information about the level of computer awareness. It was formulated that instructors from the hard sciences would perceive more

favorably computer utilization in the university than would instructors from humanities and social sciences. The findings of this study rejected this hypothesis. Considering the fairly positive perception of all instructors toward computer utilization, one possible explanation of this finding is suggested. Algerian universities have many persisting administrative problems which have not been solved by the present administration. Computerization is seen as a strong alternative to the present procedures, to alleviate the administrative problems.

The respondents with the higher educational level perceived more favorably computer utilization in some activities of Algerian universities than those with the lower educational levels. One exception was found between the two groups, in what the graduate level group was less favorable to the role of computer in the management of the university than were the other group.

Instructors were also expected to perceive more favorably computer utilization than would administrators. This hypothesis was partially rejected. This finding showed an agreement among instructors and administrators with regard to computer use in the university.

Individuals with computer experience or without computer experience were all favorably disposed toward computer utilization in the university. The extent of

computer experience was not a critical factor associated with the positive attitude toward computer utilization. These results are not consistent with the findings of Family (1980), Loyd and Gressard (1984).

It was also reported in the findings of this study that the individuals who had had computer courses, only a few of them had a chance to have a hands on computer experience. This might indicate that computer curricula, as they are applied in the Algerian university system, are focused on theoretical instruction, rather than on practice and computer use.

From this research two clear positions regarding computerization emerged. The first position represents those who believed that although computerization is important, it is not the right time to make it a priority. They believed that society has more important priorities and urgent needs than to worry about "fancy machines." This attitude might be based on the argument that attention should be paid to the existing problems by changing the procedures and habits of the current managerial techniques, and reviewing the personnel performance. The mediocrity of the Algerian administration was explained from other perspectives, such as the ambiguity in the performance standard and the absence of the rational fitness to task requirements, and others. The second position was held by those who believed that computers are a necessity because

they also believed that the on-going and overwhelming administrative problems are not likely to be alleviated by the current administration. The process of computerization could be a new form of rethinking about the actual system procedures.

The four stages of a development model presented by Robbins, et al. (1975) encompassed the initial stage, the basic stage, the operational stage and the extended stage. In light of the findings of this study, and along the lines of the above development stages model, a classification of the computing characteristics in Algerian universities was advanced. It is apparent from the earlier discussion (see Figure I) that the characteristics of the Algerian computing profile is scattered throughout the four development stages.

One component of the chararacteristics is presented in the initial stage of the model, others in the basic stage or in the operational stage. The extended stage was not considered in the Algerian profile, due to the absence of any characteristics which can match the characteristics of this particular stage.

The findings indicated that Algerian universities have some software development which is still at the research stage. The source of information and intellectual expertise is represented by the few academeclans working in the Institute of Informatics or Computer Science. This

conclusion would seem to indicate that the existing equipment capabilities in Algerian universities tended to be located between the Basic stage and Operational stage.

The perceptions of administrators and instructors toward computer utilization were significantly positive. This attitude would best match the charateristics of the operational stage. This position indicates the highest level of all components in the Algerian development profile.

The extent of computing uses and the availability of computer specialists could be located in the initial stage, or at best, between the initial stage and the basic stage.

The four characteristics discussed here, which are also factors in computing development, are interacting with each other. The absence or the failure of one component could have an important effect on the other. The absence of a sound policy and planning in the domain of informatics in the Algerian higher education system is the major factor leading to this level of development.

The problem of the Algerian university administration to utilize the actual computer resources effectively seems to be relatively not a problem of equipments as much as it is a problem of human support and planning. It is also a problem of the lack of a clear definition of the role of computing in the mission and objectives of the educational institutions.

Official statistics anticipated a very sharp increase in the number of student enrollments. The number of enrolled students in higher learning increased from 80,098 students in 1977/78 to 104.454 students in 1982/83. This number is likely to reach about 160,000 students by the year 1990. Besides that the number of instructors also jumped from 1206 teachers in 1966/67 to 20.506 teachers in 1982-83. This number also will increase by the end of the eighties.

This huge number of students, instructors, and personnel in general, certainly requires enormous administrative and managerial efforts. Higher education institutions cannot support the coming waves with better performances if they are not well organized and well equipped. Computerization, however, seems to be a very promising answer. The recorded administrative problems are considered amenable to solution by computer applications. Besides the administrative tasks, computers in the university should be used in workshops for graduate students and researchers. It is important for Algerian universities to understand that besides the administrative aspect, computers have versatile uses in all disciplines.

It is the general conclusion of this study that computing in Algerian higher education is still suffering from the chicken-and-egg relationship. Limited computer uses are the results of the lack of computer specialists and limited computer specialists means fewer computers and

little importance is given to computer education. What is needed, therefore, is the allocation of the existing potential resources and the development of a comprehensive, gradual program. It is also important to provide motivation to graduate students and faculty members, particularly those in computer science, to work on software development. In this way, the applications will certainly have a revolutionary impact on the administrative, instructional and research activities. The introduction of computer technology in higher education in developing countries could be indeed a new challenge. This requires a political vision as well as a committment to make a better use of the existing potentials and capabilities.

Recommendations

From the foregoing conclusions, suggestions for further research and recommendations are presented:

1. In view of the absence of computer use in the computer curriculum, computer programs regarding the access to computers must be assessed and reevaluated.

2. It would seem an appropriate time to take advantage of the high interest shown by Algerian faculty members and administrators, and their favorable perceptions, to move to the level of computer utilization.

3. In view of the association between computer experience, and the positive perception towards computer utilization, the development of a computer awareness program is recommended for administrators, instructors and students from disciplines other than informatics. Universities are usually closed more than two months during the summer vacation. It would be fortunate if a computer literacy program were initiated during this period.

4. A determination of student perception towards computer utilization is recommended for further research.

5. Computing Centers' activities located in various universities should be assessed and studied.

6. The Ministry of Higher Education is asked to assess the capabilities of each university throughout the country in the area of informatics, and the local experiences mainly in software development. Then, a general strategy of computing at the university should be defined with consideration given to short and long range planning.

7. A clear policy should define the role of the university in promoting computing. The relationship between universities and the Ministry of Higher Education concerning computing should be also clearly defined. University autonomy in decision making regarding this matter is appropriate in creating initiatives.

8. Further studies are recommended to be performed on a larger scale by increasing the sample to include other universities.

9. The constitution of a special committee is highly recommended, at the level of each university, to deal with the planning and the promotion of computer use at universities.

10. Algerian universities are asked to provide the necessary sources of information (books, journals among others...) regarding computers and their applications, in order to have a better use of the existing computers and to keep pace with contemporary innovations and developments.

11. A final note suggests cooperation between countries within the Arab world and especially the Maghreb countries. This cooperation could be beneficial in the area of computer education, software development, the use of arabic language and computer industry.

REFERENCES CITED

REFERENCES CITED

Akinyemi, K. 1986. "Micros and Children in Developing Countries" PLET. Vol 23, N.2, May.

Attalah, N. 1984. "L'Afrique et l'Ordinateur". Jeune Afrique. (Bis) N.1, Sept.

Baldridge, G.V; Roberts, J.W. and Weiner, T.A. 1984. "The Campus and the Microcomputer Revolution: Practical Advise for Non-technical Decision Makers", Macmillan Publishing Company, New York.

Balian, E.S. 1982. "How to Design, Analyse, and Write Doctoral Research: The Practical Guidebook". U. Press of America.

Barcomb, D. 1981:105. "Office Automation: A Survey of Tools and Techniques", Digital Press, Belford.

Benmokhtar, R.B. 1984. " Regional Computer Cooperation and Socio-economic Development: Case of Morocco" in Regional Computer Cooperation in Developing Countries" (ed) R.E Kalman. North-Holland, Amsterdam.

Bennoune, M. 1985. "The Industrialisation of Algeria" in Contemporary North Africa (ed) by Halim Barakat Croum helm london & Sydney, London.

_____1985:61. "Bright Gains in 1985 for Major Markets." Electronic Week 1 (January).

Blakesley, J.F. 1967. "Administration-Integrated Records and Procedures." in Computer and Education. (ed) Gerard, R.W. McGraw-Hill, New York.

Brown, D.J. 1984. "The Change to Administrative Computing in Schools". Association for Educational Data Systems. Vol.18, N.1.

Brownrigg, E.B. and Lynch, C.A. 1980. "Implementing library Automation Plan in a University Computing Environment" Emery, J.C (ed) Westview Press Inc., Boulder, Colorado.

Bouras, 1. 1974. "L'informatique dans un Pays en Voie de Development: l'exemple Algerien." Man and Computer. Marois M. (ed). North-Holland/American Elsevier, Amsterdam, New york.

Billings, K. 1983. "Research on School Computing". in Computers in Curriculum and Instruction". (ed) Grady, M.T. and Gawronski, J.D. ASCD publcations, Virginia.

Caffery, J., Mosmann, C.J. 1967. "Computers on Campus" American Council Education; Washington DC.

Canning, B. 1985. "Automating Document Management", Office Administration Management, April.

Carlos, A. and Rodriguez, P. 1978. "Towards a National Policy for Informatics Development."in Informatics Technology, Moneta J. (ed), North-Holland Publishing Company, Amsterdam.

Chandra, P. 1984. "Missions for Regional Computer Coopration in Education and Research" in Regional Computer Cooperation in Developing Countries. (ed) R.E. Kalman. North-Holland, Amsterdam.

Chaouch, M. 1984:24. "L'informatique Tabou en Algerie."Algerie Actualite, N. 951.

Cotterman, W.W. and Zmud, R.W. 1981. "Developing Information Systems in less-developed Countries". in Teaching Informatics Courses: Guidelines for Teachers and Educationalists. (ed) H.L.W. Jackson. North-Holland, Amsterdam.

Danielson, W.A. 1985:17. "A Report from the Barricades of the Computer Resolution on Campus". EDUCOM Bulletin. Vol 20 (4).

Dorf, R. 1977. Introduction to Computers and Computer Science. Boyd and Fraser Publishing Company, San francisco

Dowdy, S; Wearden, S. 1983:255. "Statistics for Research". John and Sons, New york.

Dunham, J.L. 1971. "The Effect of Information Retrieval by Remote Computer Terminal on Administrative Efficiency in Higher Education" Ph.D Dissertation. Arizona State University.

----------. 1985. "Educational Computing: the Global View". Electronic learning. Jan. Vol.4,N.4.

Emery, J.C. 1980. "Planning for Computing in Higher Education". Western Press for EDUCOM, Boulder , Colorado.

Evans, B.P. 1986:804. "State, Capital, and the Transformation of Dependence: The Brazilian Computer Case". World development, Vol. 14, N.7.

Fahy, J.P. 1985. "Instructor Attitudes Affecting Adoption of Instructional Innovations". A.E.D.S Journal,19 (1), 66-79.

Family, S. 1980. "The Attitudes of Iranian Academicians Toward General Use of Computers in Iran". (Ed.D Dissertation, United States International University, San Diego.

Frappat, B. 1985:11. "Universites: Orienter en Fonction des Besoins", Le Monde, 7,Dec.

Frederic, G.W. 1971. "The Use of Computers in Business Organizations". Addison-Wesley Publishing Comp. Philippines.

Forester, K. 1981:71. The Microelectronic Revolution. MIT Press, Massachusetts.

Fullan, M. 1982. "The Meaning of Educational Change". O.I.S.E. Press, Toronto

Gerver, E. 1986. "Humanizing Technology", Plenum Press, New york and london.

Ghiles, F. 1984. "Chadli's Pragmatic Economics". African Report". Vol. 29, N.6.

Gillespie, 1981:174. "Goals for Computing in Higher Education", J. of Educational Technology Systems, Vol.9

Gulati, D.V. 1981. "Problems of Acquiring, Retaining and Training of Computer Teachers in Developing Countries" in Teaching Informatics Courses: Guidelines for Teachers and Educationalists. (ed) H.L.W. Jackson. North-Holand, Amsterdam.

Gustafson, E.O. 1985. " Achievment and Attitude in a College Computer Course as Related to Hemispherity", (Ed.D Dissertation, University of Georgia).

Hachchad, M. 1982. "Informatics in Algeria" Unpublished paper presented in informatic symposium, University of Batna, Algeria.

Harvey, W. 1982-83. "Educational Technology and Third World Development."Journal of Educational Technology Systems Vol.11(3).

Heinzel, W.J. 1968. "Computer Processes and their Application to Student Records in American Higher Education." E.D Dissertation, Loyola University of Chicago.

Hines, G.S. 1977. "Why University Management Information Systems Have Failed", J.E.D.P Vol 14, N3.

Kalman, R. 1981. "Eight Strategic Issues for Informatics." In Computer in Developing Countries, Bennet, Kalman (edt) North-Holland Publishing Company, Amsterdam.

Kalman, R. 1984. "Regional Concept -Ten Years after the UN Report on Application of Computer Technology for Development" in Regional Computer Cooperation in Developing Countries. (ed) Kalman, R. North-Holland, Amsterdam.

King, A. 1982. "For the Better or for Worse the Benefits and Rises of Information Technology" in Information Technology: for the Richer or the Poorer. Born-Andersen. N; Earl. M; Holst.O and Mumford.E (eds) North Holland Publishing Company, Amsterdam.

_____. 1984. "Informatic Plan Project 1985-1989". Ministry of the Algerian Higher Education, Algiers.

Jackson, Clements, Jones. 1984-85. "Computer Awareness and Use at a Research University."Journal of Educational Technology Systems, vol. 13(1).

Levien, R.E. and Mosmann, C. 1972. " Administrative and library uses of computers". in The Emerging Technology. Mc Graw-Hill Book Company. New York.

Loyd, H. and Gressard, C. 1984. "The Effects of Sex, Age, and Computer Experience Attitudes."Association for Educational Data Systems Journal. Vol. 18 N. 2:67.

Lucas, H.C.Jr. 1975. "Performance and the Use of an Information System. Management Science, 21(8).

Maddison, J. 1983 "Education in the Microelectronics Era : A Comprehensive Approach" The Open University Press, Milton Keyness.

Malaney, G.D. 1986. "Use of a Computerized Data Base for Monitoring Graduate Education: an Analysis of Faculty and Administrative Support". J. of Educational Technology Systems, 14:239-260.

Mays, M. 1984:109. "Computer Utilization in Higher Education: Perceptions vs Realities". A.E.D.S Journal. 18 (2).

Mclsaac, D.M. 1984. "Management School Information Systems". A.E.D.S Monitor. Vol 23 (1,2).

Miller, W. 1976:6. "Computing in Network Environment: a View of the Future of Computing in Higher Education", EDUCOM, Inc. Princeton, New Jersey.

Natarajan, T.V. 1984. "Informatics and Interdependence" in Regional Computer Cooperation in Developing Countries. Kalman, R.E (ed), North-Holland.

Neiheisel, S. 1979. "The Role and Impact of Computer Technology in the Administration of Selected Institutions of Higher Education", (Ph.D Dissertation), Ohio State University.

O'Bien, J.A. 1986. "Computers and Software Processing with Software tutorial and Basic". R.D. Irwin, Inc. Homewood, Illinois.

Outhouse, A.C. 1985. "California Computer Education K12: Some Implications for Multicultural Education". Master's Thesis S.D.S.U.

Paker, Y. 1981. "Informatics and development: UNESCO'S Approach for the 80's". in Computers in Developing Nations. (ed) Bennett, J.M. and Kalman, R.E. North-Holland, Amsterdam.

Paker, Y. 1978:11. "Guidelines for the Establishement, Management and Maintenance of Small and Medium Size Computer Installations in Developing Countries." Information Technology, J. Monetta (ed). North-Holland Publishing Company, Amsterdam.

Priebe, K. 1978. " The Transfer of Computer Technology from Developed to Developing Country. Information

Technology, J. Monetta (ed). North-Holland Publishing Company.

Robbins, M.D.; Dorn, W.S. and Sketon, J.E. 1975. "Who Runs the Computers? Strategies for Management of Computers in Higher Education". Western Press, Boulder Colorado.

Rourke, E.F and Brooks, EG. 1966 "The Managerial Revolution in Higher Education", Johns Hokins Press, Baltimore, Maryland.

Stakenas, J.A. 1985. " The Impact of Microcomputer Utilization on the Organizational Structure of Student Service Units in Higher Education Institutions". (Ph.D Dissertation, University of Nebraska, Lincoln).

Sullivan, R; Lewis, T; and Cook, C. 1985. "Computing Today: Concepts and Applications". Houghton Mifflin Company. Massechusetts.

Tamir, P. 1985-86. "Current and Potential Uses of Microcomputers". Journal of Computers in Mathematics and Science Teaching. Vol.5, N.2.

Thomas, C.V. et al., 1986. "Evaluating Software: Administrators Need Help, Too", Technological Horizons in Education Journal. Vol.14, N.4.

----------, 1986. "Three Universities Jumb on Telecommunications Expansion Wagon". Tech Trend. Vol.31, N.5/6.

Tuckman, W.B. 1978:255. "Conducting Educational Research". Harcourt Brace Jovanovich, Inc. New York.

Turner, J.A. 1982. "Observations on the Use of Behavioral Models in Information Systems: Research and Practice". Information and Management, 5 (4,5).

Van Horn, L.R. 1985:6. "How Significant is Computing for Higher Education ?", EDUCOM Bulletin, Vol.20, N1.

Webb, G. 1986. "Some Observations on the Introduction of Microcomputers into a Third World Department of Education". Programmed learning and Educational Technology. Vol 23, no. 3 August.

Appendix A
(Perception Survey: English Version)

Appendix A

Cover letter

(English version)

Due to the increasing number of the university community and the activities of instruction and research, the problems of management and planning have been expanding.

I am conducting this survey on the perception of computer use in the Algerian university as part of my research which deals with the managerial and administrative problems. The accomplishement of this study depends considerably on your participation.

When you have completed answering all the questions, please return the questionnaire to the secretary of your institute in order to facilitate collection.

Thank you for your participation

Meziane Mohammed

Social Sciences Institute

Questionnaire

(English version)

1. Job : .....

2. If you are instructor, what is your position ?

.... Professor

.... Associate Professor

.... Tenure Assistant

.... No Tenure Assistant

.... Contract Assistant

3. Institute : .....

Department: .....

Speciality: .....

4. If you are an administrator, what is your position ?

.....

---

5. Level of education : .....

---

6. Where did you graduated from? .....

.....

Please answer the following questions by ("Yes", or "No").

	Yes	No
7. I have attended seminars, and workshops relating to the use of computers.	____	____
8. I am informed about the applications of computers related to my job	____	____
9. I have taken coursework relating to the use of computers.	____	____
10. I would like to have my own computer if it is posible.	____	____
11. I have seen and approached a computer.	____	____
12. I have used a computer.	____	____

Please answer these following questions by "Yes", or "No", or "Uncertain".

	Yes	No	Uncertain
13. I would like to work with the computer.	___	___	____
14. I think working with computer problems would be enjoyable and stimulating.	___	___	____
15. Do you feel confortable when you talk about computers	___	___	____
I am interested to learn about the computer to use it for:			
16. Research.	___	___	____
17. Text and word processing.	____	___	___
18. Development of my own skills.	____	___	___
19. Programming.	____	___	___

__ Other activities

Please specify

.....

.....

.....

.....

If you are interested in computers explain your reasons?

.....

.....

.....

.....

If you are not interested in computers explain your reasons?

.....

.....

.....

.....

Please respond to the following statements by choosing one of these possible answers. Place the number corresponding to your answer in the box (.....)

Stongly Agree	(1)
Agree	(2)
Undecided	(3)
Disageree	(4)
Strongly Disagree	(5)

20. Computer is a luxury for our society. .....

21. Computer is a luxury for our university. .....

22. The computerization of student records is an urgent need in our university. .....

23. The computerization of personnel records is necessary. .....

24. Scheduling requires computer assistance. .....

Stongly Agree (1)
Agree (2)
Undecided (3)
Disageree (4)
Strongly Disagree (5)

25. Computerization of university library is a must for a better functioning. .....

26. Computer is important but it is not the right time to think about it. .....

27. Computers contribute to the improvement of the university management. .....

28. Computer does not offer any advantage for Algerian Universities. .....

29. The problems of the management of our university do not have anything to do with computers. .....

30. The use of computer in managing our university requires a systematic reorganization of the university. .....

If you have any comments regarding the positive or negative aspects of the introduction of a computer in the administration of our university, please write them down.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Thank you for your participation

Appendix B
(Perception Survey: French Version)

Appendix B

Cover letter

(French version)

Vu l'accroissement rapide des effectifs de la communauté universitaire et des activités de formation et de la recherche, les problèmes de gestion et de planification prennent de plus en plus d'ampleur.

Cette étude a comme objectif la determination de l'opinion des enseignants et des administrateurs vis-a-vis de l'utilization de l'ordinateur dans la gestion de l'université. L'accomplissement de cette étude depend considerablement de votre participation.

Je vous prie de bien vouloir remplir ce questionnaire et de le deposer auprès du secretariat de votre institut.

Merci de votre cooperation

Meziane Mohammed

Institut des Sciences Sociales

Questionnaire
(French version)

1. Fonction : .....

2. Si vous êtes enseignant quel est votre grade?

__ Professeur

__ Maitre assistant

__ Maitre de conference

__ Assistant stagiaire

__ Assistant contractuel

3. Institut : .....

Departement : .....

Specialité : .....

---

4. Si vous êtes administarteur quel est votre grade ?

.....

---

5. Quel est votre diplome ?

.....

6. Où avez-vous obtenu votre diplome ?

.....

Vous êtes priés de repondre par "OUI" ou "NON" aux questions suivantes:

	OUI	NON
7. Avez-vous assisté à des seminaires ou des séances pratiques sur l'utilisation de l'ordinateur ?	.....	.....
8. Avez-vous suivi des cours sur l'utilisation de l'ordinateur?	.....	.....
9. Etes-vous informé de l'application de l'informatique dans votre domaine de travail?	.....	.....
10. Si vous aurez les moyens et les possibilités, acheteriez-vous un ordinateur?	.....	.....
11. Avez-vous déjà vu et approché un ordinateur?	.....	.....
12. Avez-vous utilisé l'ordinateur?	.....	.....

Vous êtes priés de répondre par "OUI" ou "NON" ou "JE NE SAIS PAS" aux questions suivantes:

	OUI	NON	JE NE SAIS PAS
13. Aimeriez-vous utiliser l'ordinateur dans votre travail?	.....	.....	.....
14. Est-il stimulant et plaisant de travailler sur l'ordinateur?	.....	.....	.....
15. Vous trouvez-vous à l'aise quand vous discutez de l'ordinateur?	.....	.....	.....
Etes-vous interesé d'apprendre l'ordinateur pour :			
16. __ La recherche Scientifique?	.....	.....	.....
17. __ Le traitement des textes?	.....	.....	.....
18. __ La programation	.....	.....	.....
19. __ Le developpement de mon propre savoir	.....	.....	.....

__ Autres: Specifiez s'il vous plait

.....

.....

.....

Quelles sont les raisons qui vous ont amenées à vous interesser de l'ordinateur ?

.....

.....

.....

Quelles sont les raisons qui vous ont amenées à vous desinteresser de l'ordinateur?

.....

.....

.....

Choisisez parmi les cinq categories de reponses celle qui repond à votre opinion, en mentionant le numero correspondant de votre réponse dans la case (....) de chaque question .

-- Je suis entièrement d'accord. - 1 -
-- Je suis d'accord dans la majorité des cas. - 2 -
-- Je suis sans opinion. - 3 -
-- Je ne suis pas d'accord dans la majorité des cas. - 4 -
-- Je ne suis absolument pas d'accord. - 5 -

20. L'ordinateur est un luxe pour notre societé. .....

21. L'ordinateur est un luxe pour notre université. .....

22. L'informatisation de la scolarité dans notre université est un besoin urgent. .....

23. L'informatisation des dossiers du personnel est necessaire. .....

24. La preparation des emplois du temps exige l'aide de l'ordinateur. .....

-- Je suis entièrement d'accord. - 1 -
-- Je suis d'accord dans la majorité des cas. - 2 -
-- Je suis sans opinion. - 3 -
-- Je ne suis pas d'accord dans la majorité des cas. - 4 -
-- Je ne suis absolument pas d'accord. - 5 -

25. L'informatisation de la bibliotheque l'université est indispensable pour son bon fonctionnement. .....

26. L'utilisation de l'ordinateur est necessaire et importante mais ce n'est pas le moment d'y penser. .....

27. L'ordinateur contribue a l'amelioration de la gestion de l'université. .....

28. L'ordinateur ne presente aucun avantage pour notre Université. .....

29. Les problèmes de gestion de notre université n'ont rien avoir avec l'informatique. .....

30. L'informatisation de la gestion à l'universite necessite une reorganisation systematique de celle-ci. .....

Si vous avez des remarques concernant l'introduction de l'informatique dans la gestion de l'université (les aspects positifs et negatifs), notez les s'il vous plait.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Merci de votre cooperation

Meziane.M

I.S.S

Appendix C
(Perception Survey: Arabic Version)

الى الاخ الكريـــم:

نظرا للازديـاد السريـع في عدد افراد الاسرة الجامعـية و تعـــدد نشاطات التكويـن و البحث ، فان مشـاكل التسيـــر و التخطيط تاخـذ ابعـادا واسعـــــــة.

تهدف هذه الدراسـة التعرف على ا راء الاسـاتذة و العمال الاداريين ازاء استعمـال الحاسب الالـــي في مجال التسيير الجـــــــــامعـــي

تعتبـر مشاركتكـم مهمـة لتحقيـق اهداف هـــــــــذه الدراســـة، فالرجـاء منكـم ملء هذه الاستمـارة ثـم تسليمهـــــــــا لامـانة معهدكـــــــم.

شكرا على تعاونكـــم

مزيان محمد
معهد العلوم الاجتماعية

1. الوظيفة : .....

2. اذا كنت استاذا فما هي درجتك المهنية :

.... استاذ (بروفسور)

.... استاذ محاضر

.... استاذ مساعد

.... مساعد متربص

.... مساعد متعاقد

3. المعهد : .....

الدائرة : .....

الاختصاص : .....

4. اذا كنت اداريا ، فما هي درجتك المهنية ؟

.....

5. ذكر مستواك التعليمي : .....

6. اين زاولت تعليمك ؟ .....

الرجاء الاجابة بنعم او لا عن الاسئلة الاتيـــة

	نعم	لا
7. هل حضرت ملتقيات او حصص تطبيقية حول استعمال الحاسب الالـــــي ؟	.....	.....
8. هل تابعت دروسا حول استعمال الحاسب الالي خارج تكوينك الرسمـــي ؟	.....	.....
9. هل لديك معلومات عن جوانب استعمال الحاسب الالي في وظيفتك ؟	.....	.....
10. اذا كنت قادرا على شراء حاسب الي ، هل ترغب في شراءه ؟	.....	.....
11. هل سبق لك ان رايت واقتربت من حاسب الـــي ؟	.....	.....
12. هل سبق لك ان استعملت حاسب الـــي ؟	.....	.....

الرجاء الاجابة بنعم او لا او لا اعرف عن الاسئلـــة الاتيـة :

	نعم	لا	لا اعرف
13. هل ترغب في استعمال الحاسب الالي في وظيفتـــــــــك ؟	.....	.....	.....
14. هل تعتقد ان الاشتغـال على الحاسب الالـي مثيـر و مشوق ؟	.....	.....	.....
15. هل تشعر بارتيـاح عندما تتحدث او تناقش موضوع الحاسب الالـــــــي ؟	.....	.....	.....

هل ترغب في تعلـم الحاسب الالي بغـــــــــرض :

16. البحث العلمي ؟	.....	.....	.....
17. معالجة النصوص ؟	.....	.....	.....
18. تطوير معلوماتي الشخصيـــــة ؟	.....	.....	.....
19. البرمجـــــة ؟	.....	.....	.....

اغراض اخرى (حدد): .....

.....

ما هي الاسباب التي جعلتك تهتم بالحاسب الالي ؟

.....

.....

.....

ما هي الاسباب التي جعلتك لا تهتم بموضوع الحاسب الالي ؟

.....

.....

.....

الرجاء اختيار جواب من الاجوبة الخمسة الاتية التي توافق رايك و ذلك بكتابة رقم الجواب في الفراغ الموجود امام كل فقرة.

اوافق جدا	-1-
اوافق في معظم الحالات	-2-
ليس لي راي	-3-
لا اوافق في معظم الحالات	-4-
لا اوافق اطلاقا	-5-

20. الحاسب الالي يعد من الكماليات بالنسبة لمجتمعنا .....

21. الحاسب الالي يعد من الكماليات بالنسبة لجامعتنا .....

اوافق جدا	-1-
اوافق في معظم الحالات	-2-
ليس لي راي	-3-
لااوافق في معظم الحالات	-4-
لا اوافق اطلاقـــا	-5-

22. ان ادخال الاعلام الالي لمعالجة ملفات الطلبة ضرورة ملحـــــة .....

23. الحاسب الالي ضروري لمعالجـــة ملفات موظفـي الجامعـــــــة .....

24. الحاسب الالي ضروري لاعداد استعمال الزمـــــــــن. .....

25. استعمال الحاسب الالـي في المكتبات الجامعية شرط لازم لتحسين سير اعمالها .....

26. ان استعمال الاعلام الالي في جامعتنا مهم و لكن لم يحل وقت التفكير فيه .....

27. الحاسب الالي يساهم في تحسين سير الجامعـــــــة .....

28. ان الحاسب الالي ليس له اي دور اجابي بالنسبة لجامعتنـــــا .....

29. ان مشاكل الجامعة لايمكن حلها عن طريق الاعلام الالـــــــي .....

30. ان ادخال الاعلام الالي في تسيير الجامعـة يقتضي اعادة التنظيم الكلي لهـــــا .....

اذا كانت لديكم بعض الملاحظات فيما يتعلق بادخال الاعلام الالي في تسيير الجامعة (الجوانب السلبية و الجوانب الايجابية)، فالرجاء ذكرها .

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

شكرا على مشاركتكم

Appendix D
Frequencies and Percentages of the Perception of the Respondents Toward Computer Utilization

Appendix D

Table 10

Frequencies and Percentages of the Perception of Respondents Toward Computer Utilization

	1*		2		3		4		5	
Items	N	%	N	%	N	%	N	%	N	%
20.	13	12.1	8	7.5	14	13.1	15	14.0	53	49.5
21.	16	15.0	7	6.5	14	13.1	4	3.7	63	58.9
22.	80	74.8	15	14.0	4	3.7	4	3.7	3	2.8
23.	73	68.2	12	11.2	10	9.3	3	2.8	7	6.5
24.	59	55.1	19	17.8	13	12.1	3	2.8	9	8.9
25.	72	67.3	15	14.0	8	7.5	5	4.7	3	2.8
26.	77	72.0	15	14.0	9	8.4	1	.9	1	.9
27.	9	8.4	11	10.3	17	15.9	13	12.1	52	48.6
28.	8	7.5	4	3.7	11	10.3	7	6.5	71	66.4
29.	10	9.3	10	9.3	12	11.2	13	12.1	57	53.3
30.	59	55.1	12	11.2	20	18.7	6	5.6	6	5.6

* Attitude scale 1 = I entirely agree, 2 = I agree in the majority of cases, 3 = undecided, 4 = I disagree in the majority of cases, 5 = I absolutly disagree.

Appendix E
Estimation of Enrolled Students in Computer Science

Appendix E

Estimation of Enrolled Students in Computer Science 1985-89

Year and type of Institution	1985 86	1986 87	1987 89	1988 89
H.B.T.S.U, Algiers	850	940	1040	1140
T. Ouzou U.C	120	155	190	230
Constantine Un.	400	480	570	700
Annaba Un.	200	220	240	270
Un.C of Batna.	50	65	85	110
Un.C of Setif.	100	140	200	260
Un of Oran.	200	220	240	270
Un.C of Tlemcen.	30	50	70	100
Un.C of S.Bellabes.	50	70	100	140
Un.C of Mostaganem.	50	70	100	140
Un of Tech, Oran.	50	60	70	90
Total	2100	2470	2905	3450

Position of Informatics Students with respect to the Technology Sciences (1988-89): $\frac{3450}{36.000} = 6.2\ \%$

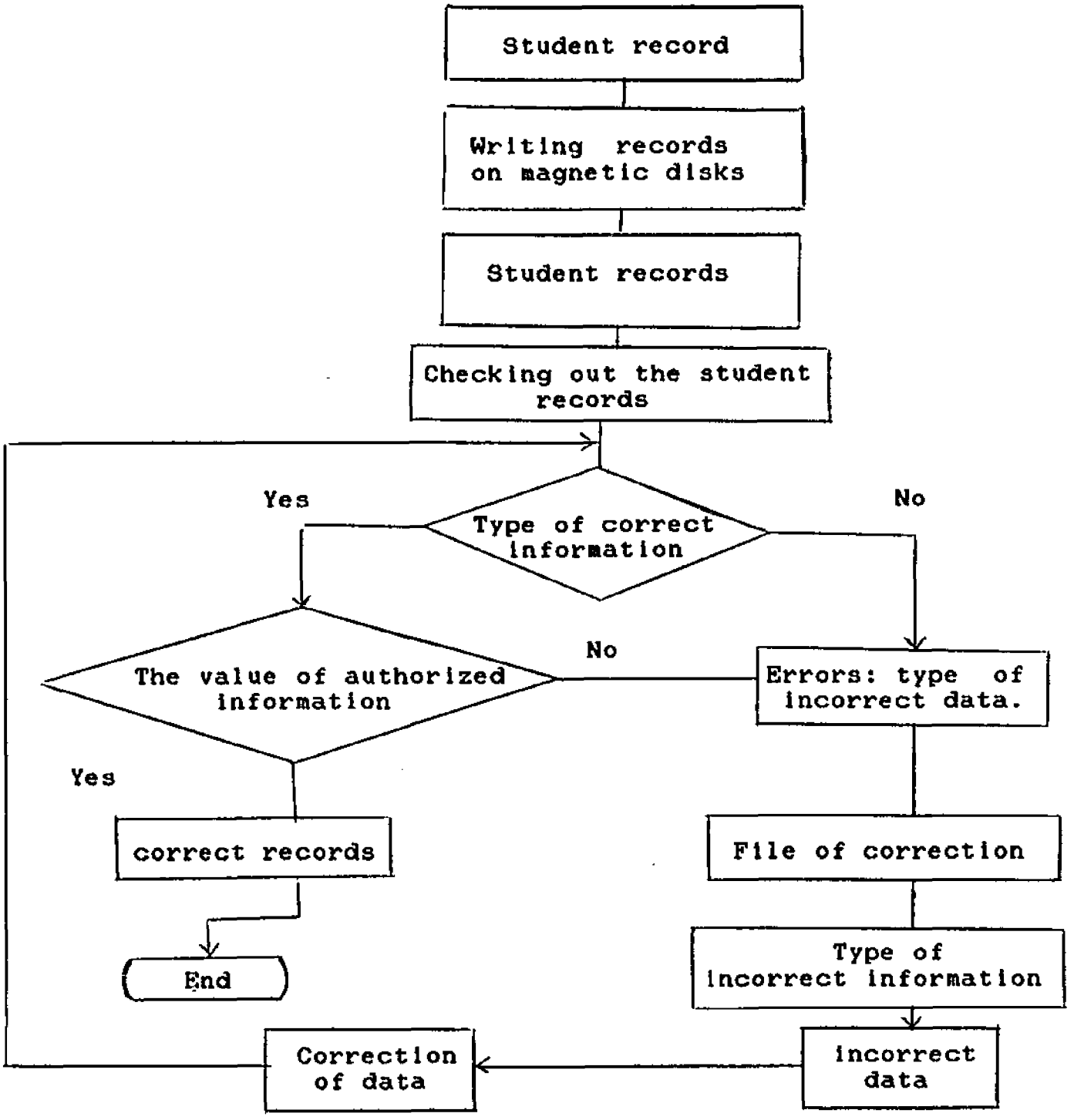


Figure II
General functions of student file