Dedicated to the Ones I Love:
Mom and Dad

The Adoption of the Use of Computers:

A Case Study of Students of the School of Social Development, National Institute of Development Administration

Thesis
By

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ABSTRACT

THESIS: The Adoption of the Use of Computers: A Case Study of Students of the School of Social Development, National Institute of Development Administration

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The objectives of this study were threefold: 1) to explore the state of the use of computers of the students of the School of Social Development of the National Institute of Development Administration; 2) to examine factors affecting attitude toward computers; and 3) to investigate these students' opinion about the course of SD. 502 (Computers for Social Development).

The population of the study comprised all students who were studying in the School of Social Development of the National Institute of Development Administration in Bangkok in October, 1994, during which the researcher conducted this research. The accidental sampling technique was used to gather the sample, which consisted of 173 cases. A questionnaire was constructed for collecting the data.

The major findings were as follows:

1) Generally, the students had a favorable attitude toward computers. Innovativeness was found to have a positive relationship with attitude toward computers.

2) Regarding the characteristics of the innovation, the majority of students believed that a computer was useful and compatible with their tasks and that it was neither too difficult nor too easy to use a computer.

3) Age, attitude toward computers and innovativeness were found to be able to discriminate among the three groups of students: those who had not yet adopted the use of computers, those who had adopted it through the authority decision, and those who had adopted it through the optional decision. Students who had adopted the use of computers through the optional decision seemed to be very young and more innovative and have a high positive attitude toward computers, whereas students who had not yet adopted the use of computers appeared to be rather old and less innovative and have a low positive attitude toward computers. Students who had adopted the use of computers through the authority decision fell between these opposite sets of attributes. In other words, they were neither very young nor very old. Their levels of innovativeness and of attitude toward computers were of average magnitude. However, the classification power was not great; the correct classification rate was 57.23 %. It was also discovered that students' jobs were associated with the innovation-decisions. Those students who never worked or had a job at the low level were more likely to adopt the use of computers by their own will whereas those students who had a job at the higher level were more likely to adopt the use of computers by necessity either due to work or due to studying SD. 502.

4) Only three kinds of the computer use were reported: printing, calculation, and retrieval. The perceived complexity of using a computer was found to be the most influential factor affecting the ways students used a computer for all kinds of the computer use. Other factors were such as types of students and age.

5) Most students who always used a computer by themselves gave the reasons that it was convenient to do the task on their own and that they could produce a better output when they used a computer by themselves. On the other hand, most students who did not at all use a computer by themselves reported the reasons that they could not use a computer to produce the desired results and that they had personnel in charge of doing the tasks for them. Most students who sometimes used a computer by themselves and sometimes had someone else do the computer work expressed a combination of reasons of the two groups above. In other words, they used a computer by themselves if it was

convenient or if they could generate better results but had others do the computer work they did not how to do it or let their personnel do the work for them.

6) Several students who did not use a computer by themselves now expressed that in the future they would try to use it by themselves to some degree. And almost all students who used a computer by themselves now said that they would continue to use it by themselves in the future.

7) Many students used a computer at the School's computer lab most frequently and most students expressed that there were insufficient computers in the School's computer lab for students to use .

8) It was discovered that no matter what the students used a computer for and where they used it, most students had similar problems about computer knowledge and gaining access to computers but had other different problems depending on where they used a computer. Regarding the suggestions about using a computer, most students expressed that they wanted to have a well-conditioned computer lab

9) It was discovered that whether SD. 502 should be a required or selective course was a function of the level of computer knowledge the students wanted to have, which in turn was a function of how likely they would use a computer again after graduating. Some students wanted SD. 502 to be a required course because they wanted a great deal of computer knowledge and in turn because they were more likely to use a computer again after graduating whereas some students wanted SD. 502 to be a selective course because they wanted a small amount of computer knowledge and in turn because they were less likely to use a computer again after graduating.

The researcher's suggestions were as follows:

1) The School should offer two different computer courses: one as a required course and one as a selective course.

2) The School's computer lab should be modified to facilitate the students' use of computers.

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TABLE OF CONTENTS

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		Page
Abstract		i
Acknowledgments		iv
Table of Contents		v
List of Tables		vii
List of Figures		ix
Chapter I	Introduction	1
	1. Significance of the Problem	1
	2. Objectives and Contribution of the Study	9
	3. The Scope of the Study	9
Chapter II	Review of Literature	10
	1. The Diffusion of Innovations	10
	2. Computers	21
	3. Related Studies	23
Chapter III	Methodology	36
	1. Population and Sampling	36
	2. The Instrument	37
	3. Conceptual Framework	39
	4. Hypotheses	40
	5. Data Analysis Procedures	40
	6. Operational Definitions	41

Chapter IV	Data Analysis	42
	1. Characteristics of the Sample	42
	2. Characteristics of the Innovation	52
	3. The Adoption of the Use of Computers	53
	4. The Use of Computers	62
	5. Students' Opinions about SD. 502	94
Chapter V	Conclusions and Suggestions	95
	1. Conclusions	95
	2. Suggestions	104
Bibliography		108
Appendix		115
Vita		125

LIST OF TABLES

Table		Page
1	Innovativeness and Attitude toward Computers	49
2	Means and Standard Deviations of the Independent Variables in the Regression Analysis of Attitude toward Computers	50
3	Correlation Coefficients Among Independent Variables	50
4	Results of the Regression Analysis	50
5	Means and Standard Deviations in the Discriminant Analysis for Prediction of Types of the Adoption on the Basis of the Discriminating Variables	54
6	Results of the Discriminant Function Analysis	55
7	Unstandardized Canonical Discriminant Function Coefficients of the Variables in the Model	55
8	Standardized Canonical Discriminant Function Coefficients of the Variables in the Model	56
9	Canonical Discriminant Function Evaluated at Group Means (Group Centroids)	56
10	Residual Discrimination and Test of Significance	56
11	Means and Standard Deviations of the Independent Variables Used in the Logistic Regression Analysis of Using Computers for Printing	63
12	Variables Included in the Logistic Regression Model of Using Computers for Printing	63
13	Means and Standard Deviations of the Independent Variables Used in the Logistic Regression Analysis of Using Computers for Calculation	64
14	Variables Included in the Logistic Regression Model of Using Computers for Calculation	64
15	Means and Standard Deviations of the Independent Variables Used in the Logistic Regression Analysis of Using Computers forRetrieval	69
16	Variables Included in the Logistic Regression Model of Using Computers for Retrieval	69

17	**Reasons for Ways of Using a Computer for Printing**	78
18	**Reasons for Ways of Using a Computer for Calculation**	79
19	**Reasons for Ways of Using a Computer for Retrieval**	80
20	**Troubles of Using Computers**	88
21	**Suggestions about Using Computers**	89
22	**Means and Standard Deviations of the Independent Variables Used in the Logistic Regression Analysis of the Opinion about SD. 502**	91
23	**Variables Included in the Logistic Regression Model of the Opinion about SD. 502**	92
24	**The Desired Levels of Cmputer Knowledge**	94

LIST OF FIGURES

Figure		Page
1	A Model of Stages in the Innovation Decision Process	13
2	The Conceptual Framework	39
3	Types of Students	42
4	Sex of the Respondents	43
5	Age	44
6	Marital Status	45
7	Students' Working	46
8	Income by Students' Jobs	47
9	Home Computers	48
10	The Perceived Advantage, Compatibility and Complexity of Computers	52
11	Decisions to Adopt the Use of Computers	53
12	The Classification Results of Discriminant Analysis	58
13	Types of Decision to Adopt the Use of Computers by Students' Jobs	59
14	Kinds and Ways of Using Computers	62
15	The Classification Results of the Logistic Regression Analysis of Ways of Using Computers for Printing	65
16	The Classification Results of the Logistic Regression Analysis of Ways of Using Computers for Calculation	68
17	The Classification Results of the Logistic Regression Analysis of Ways of Using Computers for Retrieval	71
18	Computer Users for Students who Did Not at all Use Computers by Themselves for Printing	72
19	Computer Users for Students who Used Computers by Themselves to a Certain Extent for Printing	73
20	Computer Users for Students who Did Not at all Use Computers by Themselves for Calculation	74
21	Computer Users for Students who Used Computers by Themselves to a Certain Extent for Calculation	75

22	Computer Users for Students who Did Not at all Use Computers by Themselves for Retrieval	76
23	Computer Users for Students who Used Computers by Themselves to a Certain Extent for Retrieval	77
24	Ways of Using Computers Now by those in the Future	82
25	Sources of Computer Knowledge by Students' Jobs	84
26	The Places Students Used Computers Most Frequently by Possession of a Home Computer	85
27	Opinions about the Number of the School's Computers	86
28	The Classification Results of the Logistic Regression Analysis of Opinions about SD. 502 (Computers for Social Development)	93
29	Mean Ranks of the Desired Levels of Computer Knowledge by Probability of Using a Computer after Graduating	95

CHAPTER I

INTRODUCTION

1. Significance of the Problem

We are now confronting one of the great revolution—the computer revolution. The world is becoming increasingly computerized. Computers are universally present. They have become crucial instruments to perform a large number of useful applications in such diverse fields and profession as business, the military, science, medicine, education, leisure and sports. Individuals of each branch have tried to make use of this technological innovation to increase the efficiency of their works. They view computers as powerful and versatile tools. There are countless computer applications for individuals to choose as means to improve their performance.

In the field of business, computers are used widely. Computers are applied to analyze such business matters as financial inspection, market survey and performance evaluation of employees. Important information is collected by computers. This is especially true in investment where investors and speculators rely on up-to-the-minute information for their momentous decisions. In real estate and finance, computers are used to investigate cash flows, returns on investment, and depreciation. Bankers use computers to run transactions involving a great deal of money. In manufacturing, computers are used to design new products, control manufacturing equipment, and regulate inventories and other raw materials. Managers use computers to control aspects of manufacturing operations. Many stores, ranging in size from small ones like bookstores to big ones like department stores, use computers to keep records of buying and selling. Computers are also used to check out customers conveniently and quickly (Stair, 1986: 9).

In the military, computers are used to design modern weapons. Aircraft, ships, and submarines contain very sophisticated computers to help them seek and destroy the enemies while performing evasive maneuvers. Computers are also used to simulate war games and plan war strategies (Stair, 1986: 22).

Scientists from various fields use computers to help gain insight in their studies. It is estimated that over half of the world's scientific knowledge has been obtained since the construction of the first electronic computer (Stair, 1986: 12-14). Complex computations can be made easily and rapidly by computers. Astronomers use computers to help test physics theories. Computers in satellites are used to prospect oil and minerals. Meteorologists use computers to help forecast complicated weather patterns and systems. Today computers are being used to help fish, birds, whales, and other important wildlife to survive. Biologists and ecologists use computers to track endangered species and analyze a huge amount of data currently being collected every day on all types of living creatures and on the environment.

Not only are computers used in performing the business functions of hospitals and other medical facilities, but they are also used in medical research and treatment. Nowadays, computers are being increasingly used to store medical records. These records may contain information such as the patient's name, address, sex, blood group, date of hospital admission, present symptoms, and a detailed medical history which can be readily updated. Many medical apparatuses contain computers. Some examples of computer applications in medicine are monitoring the patient's states such as blood pressure, respiration rate, heart rate, and body temperature, analyzing the nutrition of a meal, developing dietary plans, and keeping track of exercise programs of all types. Many hospitals use computers to develop colorful and graphic scanners that can be used to show slices through minute parts of the body. Some ambulances are equipped with computers that can be used to diagnose potential problems and prescribe their remedies at the scene of an accident (Stair, 1986: 14-15; Atkin, 1980: 240).

Computers are extensively used in the entertainment and leisure industries. Such world-famous movies as Terminator II and The Jurassic Park used computers to generate fantastic imagery that looked absolutely real. Many of today's special effects come from computers. Musicians use computers to compose music. Computers are used to analyze and create beautiful musical sounds and tones. Many individuals play games on computers. There are various types of games, ranging from child games like CD-Man to adult games like Strip Poker (Stair, 1986: 18, 438).

Computers are also used in sports. They are used to recruit players, analyze and design new plays, help individual players perform to their potential, make draft picks, and handle the day-to-day business operation of sports. When applied to analyze the style, timing, and movement of an athlete, computers can pinpoint the athlete's strength and weakness. The findings of the analyses can be used to design training programs geared to individual needs. Many athletes improve their techniques and performance through computers. Experts use computers to help train, feed, schedule, condition, and analyze competitors. In sport contests, computers are used to schedule events, compile results, and help the press report the results to the world (Stair, 1986:15-16, 437).

The applications of computers in education are rapidly increasing. These applications may be classified into two categories according to their primary purposes: the use of computers as teaching machines and as learning tools.

The most general term for educational applications of computers is computer-based education (CBE). Some schools and universities include CBE activities in the curriculum. Just as there are many styles of teaching, so there are many teaching techniques of the CBE programs. Simple CBE programs apply a method named "drill-and-practice." The drill-and-practice programs first teach the students the subjects, then ask the students some questions, and wait for the students' answers. If the students supply wrong answers, the computers will correct them and provide the explanation. At the end of the programs, the computers can also offer a test to assess the students' level of knowledge. Students can now study certain subjects on their own by means of computers. There are educational programs that can teach the users such subjects as art, mathematics, and foreign languages. There are even programs that can teach the users how to use a computer. More advanced CBE programs use the techniques of simulation. These programs can simulate a situation or thing that is so dangerous or rare that it usually cannot be experienced naturally. The variables of a problem may present difficulties of access, as in the case of motion governed by gravitation on an astronomical scale, or the runaway of a nuclear reactor. Earthquakes and volcanic eruptions cannot be created in a laboratory. Computer simulation are also used when the real equipment may not be available due to expense, or when there may be serious danger to the students in using the actual apparatus. Violent chemical reactions, for example, are too dangerous to expose students to directly. Through computer simulation, however, students can acquire experience with these and other natural phenomena. Another example is the use of computer simulation to study anatomy of medical students. Computers are used to model parts of the human body in order to enable the students to increase their understanding of the way in which various organs operate and interact with other systems of the body. By providing captivating graphics, computer simulation can bring difficult and abstract ideas to life (Brent and Anderson, 1990: 364-372; Wessells, 1990: 229-232; Atkin, 1980: 241, 243).

Computers are also remarkably powerful learning tools. Many students turn to computers to help with the tasks of writing. Using word processors, writers can write --or in fact, type—anything in mind in any order and reorganize or revise it later. While revision on paper can lead to scratchy messes, revision by means of word processors enable writers to make corrections as many as they wish while they are writing. Besides, some word processing programs have some valuable features for writing that other means of writing cannot offer. For example, some word processing programs can check such errors in writing as spelling, punctuation, and grammar and can even suggest correction to those errors. Apart from using computers for writing, many students use computers for their research and statistical analysis. Students can record their data and retrieve them easily by the use of computers. Furthermore, computers are increasingly used for the retrieval of bibliographic information. In addition, many students do their statistical analysis by computer rather than by hand. Computers enable students to perform more advanced statistical analyses that were once considered very difficult and formidable (Brent and Anderson, 1990: 160, 243, 318; Wessells, 1990: 234-236).

The Thai government has often been criticized for being slow to apply modern technology within its departments. But things have changed. Certain government departments have adopted the use of computers to enhance its efficiency.

To improve its document management system, the Cabinet Office began implementing the computer technology in 1989. The computerized system enable the office to speed up searches and to improve the record maintenance of more than 300,000 Cabinet resolutions passed since 1932. Besides, it can help solve the problem of building spacious room for filing and storing voluminous paper documents (Rommnik and Kittikorn, 1994: F1).

The Ministry of Public Health has introduced the "Telemedicine" project. This project was initially created to reduce the number of patient deaths during transference to central hospitals by providing expert treatment from a central hospital in Bangkok through a video conferencing system. Providing medical consultation through satellite reduces not only the number of patient deaths but also the cost of transportation. It will be not necessary to transfer patients from small hospitals up-country to central ones, especially the hospitals in Bangkok. When provincial hospitals have a problem examining a patient, they can send X-ray film or electrocardiographs (ECG) to ask for the correct treatment form a specialist at a central hospital in Bangkok. This project is expected to start at the beginning of next year. In the first phase, Rajviti Hospital will communicate via Thaicom, the first Thai satellite, with Khon Kaen Regional Hospital, which will act as the provincial headquarters, linking Petchabun's Lom Kao district in the north and three other hospitals in the northeast, including Tabor Hospital in Nong Kai, Sawangdaendin Hospital in Sakon Nakon and Nagrong Hospital in Buri Ram. During 1996 to 1998, the project will be expanded to the North and the South respectively (Rommuk, 1994: F1).

Some new treatment involves the use of computers. The ontological centers of the Mahidol Medical Hospital and of Rama Hospital have recently acquired a computer system and a special software package called "speech view II." This computer-based technique allows deaf people to teach themselves how to speak. This system has proved to be beneficial; it relieves the center staff of overwork and gives the patients an enjoyable activity that challenges them (Pongpen, 1994 A: F1-F2).

The passport Division of the Ministry of foreign Affairs has adopted the use of computers. Its manual process has been converted to a computerized system. Computers are integrated into every passport application process, which helps solve many previous problems. Before the emergence of the use of computers, applying for a passport used to be time-consuming. Now it took only fifteen to twenty minutes compared with the earlier waiting time of two to three hours, thanks to the use of information technology. The new system also offers more security than the old system which employed the manual process. This new system can help avert the illegal forgery of passports, perfect the detection of people in the blacklist, and retrieve any information on an application for identification. According to Suphot Dhirakosal, Director of the Passport Division, the Thai Passport

Division's system can be regarded as one of the most advanced and secure systems in the world (Pongpen, 1994 B: F1).

The Revenue Department has created a new on line service that allows businessmen to pay their taxes via an electronic data interchange (EDI) system. To use this computerized method, the company must process the personal income tax form (Por Ngor Dor 9), which can be found in computer stores on computer diskettes, for each of its employees using a computer program and store the results on a computer diskette. The diskette is then delivered to the department for processing. The Revenue Department's director general Mr. Chata Mongol claimed that this new method id more convenient than submitting conventional paper documents and quoted such big companies as Siam Steel CO to take as an example. Siam Steel CO has already used a computer diskette to file the personal income tax of its 1,000 employees (Nittaya, 1994: F2).

Realizing the importance of information, the Bangkok Metropolitan Administration (BMA) has decided to use computers to process its vast amounts of information. The computerization project, which is due to start operating next year, will link together all the vital BMA departments and provide information for high-level administrators as well as lower-ranking officers. This computer system will handle the key functions that run a city. They include a system that handles citizen registration function, city budgeting, income, financing, the procurement process, city assets, accounting and the hiring of outside staff who work for the city. Information that is fed into these nine subsystem will eventually come from a city-wide on-line link from the 38 districts and the 14 departments that make up BMA. The BMA computer system will also link up to computer systems maintained by other local governments, so they can share information that is useful to both sides. Wattha Hoonpongsimanont, director of the computer division, part of the Department of Policy and Planning which overlooks the computerization project, expects that the computer system will benefit BMA city management but notes that it will take some time before the system can be used to its fullest potential. He says that the problem is not with the computer system itself but rather the computer literacy of people who will operate the system. It will take quite a while to educate BMA's 60,000 officers and workers, who are accustomed to working with paper documents, to be able to use the system (Yongyuth and Chanida, 1994: F1, F8).

Needless to say, traffic congestion is one of the major problems besetting Bangkok. Several plans have been introduced to solve the traffic problem. One of them is a plan to use computers to operate the traffic control system. According to the governor of Bangkok Metropolitan Administration (BMA), Krisda Arunwongse Na Ayudhya, the first phase of the Bangkok Area Traffic Control (ATC) project will be ready to operate by August next year. The first stage of the project will put 143 traffic intersections under computer control, which is expected to be able to reduce the traffic problem. This computerized control system will be of benefit to especially people who use public transportation. As a bus in the bus lane approaches a controlled intersection, the lights will either stay at or return to green. Consequently, it can move quicker around the streets, and more people may be attracted to its service, perhaps reducing the use of personal cars (Kittikorn, 1994: F2).

In order to educate Thai youth about the hazard of narcotics, the Office of the Narcotics Control Board has presented educational software. These educational programs, developed by Computer Age Technology CO LTD and Sukhothai Thammathirat University, will provide children with the information about the dangers of narcotics. Children can get both knowledge and fun form the programs. These programs will be introduced to schools for free (The Nation, 1994: F3).

It is agreed now that we are living in the world of information. Information is deemed paramount. Power will flow to those who have the best information about the limits of information, as Alvin Toffler puts it (1991: 147). And the ultimate source of information in today's world is indisputably the Internet. The Internet is the world's largest computer network and the nearest thing to a working prototype of the information superhighway. It is a global network of networks that links together the large commercial computer-communications services as well as tens of thousands of smaller university, government and corporate networks. The Internet enables computers of all kinds to share services and communicate directly, as if they were part of one giant, seamless, global computing machine (Elmer-Dewitt, 1994: 34-40). It is estimated that the Internet have reached 32 million people in 81 countries around the world. Thai leading academics voice confidence that the number of Internet users in Thailand will increase and the Internet will soon play a major role in the economy and other areas of business. Accordingly, the Ministry of University Affairs has tried to boost use of the Internet in Thailand by academics and has plans to promote public awareness about the world's biggest on-line resource (Anyamanee, 1994: F2). With the Internet, students can access data from 1,000 libraries worldwide. University lecturers can trade opinions and ideas with their counterparts in other countries. The bank industry benefits from the quick response time saving and cost reductions. In the healthcare industry, the Internet will tie together hospitals, doctors' offices, medical research institutes, pharmacies and insurers in ways which will make the practice of medicine far more effective. The network will enable remote examination, treatment and monitoring of patients. When it comes to leisure activities, people can enjoy thousands of services from such topics as news, music, poetry, or even cooking.

The Thai government deems that computer literacy is of crucial importance. It has recently begun a comprehensive computerization project, which includes the installation of a massive computer system for use by the revenue department, the creation of a nationwide population database by the local administration department, the creation of database by the land department, and a project to establish a nationwide electronic data interchange network. According to the regulation set by the Economic Minister Committee, each public office is required to be equipped with at least two computers, and government officials who want to be promoted from C5 to C6 will have to not only have knowledge of spreadsheets but also possess the requisite knowledge of the IT policy of the government. This regulation will unquestionably increase the number of government computer-literate officials (Sai-sapai, 1994: 14)

Certain students of the school of Social Development of the National Institute of Development Administration have adopted computers for their studies. They find that computers surpass typewriters and, consequently, use computers for writing instead of typewriters. Using computers, these students produce neater papers that look professional. They also use computers to retrieve bibliographic information. In addition, these students perform statistical analysis by computers rather than by hand.

While some students are trying to make full use of computers for their studies, there are some students who take no notice of this powerful innovation. This phenomenon aroused the researcher to explore the state of the adoption of the use of computers of students of the School of Social Development of the National Institute of Development Administration.

2. Objectives and Contributions of the Study

The main objectives of this study were threefold:

1) To explore the state of the adoption of the use of computers of the students of the School of Social Development of the National Institute of Development Administration.

2) To examine factors affecting attitude toward computers.

3) To investigate these students' opinions about SD. 502 (Computers for Social Development).

The School could view the findings as new information and take it into consideration when considering improving the School's curriculum regarding computer studies.

3. The Scope of the Study

This research is a case study of the adoption of the use of computers of students of the School of Social Development of the National Institute of Development Administration. The scope of the study of is limited to the students in Bangkok.

CHAPTER II

REVIEW OF LITERATURE

1. The Diffusion of Innovations

Rogers (1983: 10) defines diffusion as the process by which (1) an ***innovation*** (2) is ***communicated*** through certain ***channels*** (3) ***over time*** (4) among the members of a ***social system***. The four main elements in the diffusion of innovations are thus the innovation, communication channels, time, and the social system.

1.1 The Innovation

An ***innovation*** is an idea, practice, or object that is perceived as new by an individual (Rogers, 1983: 11). It does not matter whether or not an idea is "objectively" new as measured by the lapse of time since its first use or discovery. It is the perceived or "subjectively" newness of the idea of the individual that determines the novelty of the idea. If an idea seems new to the individual, then it is an innovation. Newness in an innovation does not necessarily involve new knowledge. People may have known about an innovation for some time, but they have not yet developed a favorable or unfavorable attitude toward it, nor have adopted or rejected it.

Characteristics of an innovation, which in part determine its rate of the adoption, are classified into five categories as follows (Rogers, 1983: 15):

1.1.1 Relative Advantage

Relative advantage is the degree to which an innovation is perceived as better than the idea the innovation supersedes. The individual not only objectively but also subjectively evaluates the advantages and disadvantages that they will obtain from an innovation, as there are two major aspects of the degree of relative advantage: economic and social aspects. The greater the perceived relative advantages and the lesser perceived relative disadvantages, the more rapid the rate of adoption will be (Rogers, 1983: 15, 213-218).

1.1.2 Compatibility

Compatibility is the degree to which an innovation is perceived as being consistent with existing values, past experiences, and needs of potential adopters. An innovation can, therefore, be compatible or incompatible (1) with sociocultural values and beliefs, (2) with previously introduced ideas, and (3) with client needs for innovations. An innovation that is compatible with these factors will get adopted at a greater rate than an innovation that is not in accordance with these factors (Rogers, 1983: 15, 223-226).

1.1.3 Complexity

Complexity is the degree to which an innovation is perceived as difficult to understand and use. Some innovations are readily comprehended and will get adopted rapidly while others are much more complicated and will get adopted more slowly (Rogers, 1983: 15, 230-231).

1.1.4 Trialability

Trialability is the degree to which an innovation may be experimented with on a limited basis. An innovation that can be tried on the installment plan will generally get adopted more quickly than an innovation that is not divisible. Some innovations are very difficult to divide for trial than others, whereas others cannot at all be divided for experiment. An innovation that is triable represents less uncertainty to an individual who is considering it for adoption (Rogers, 1983: 15-16, 231).

1.1.5 Observability

Observability is the degree to which the results of an innovation are visible to other individuals. The consequences of some innovations can be easily observed and communicated to other people while the results of some innovations are unobservable and difficult to describe to others (Rogers, 1983: 16, 232).

1.2 Communication Channels

Rogers (1983: 5-6, 17-19) defines communication as the process by which participants create and share information with one another in order to reach a mutual understanding. Diffusion is a special type of communication in which the information that is exchanged is concerned with new ideas. It is this newness of the ideas in the message content of communication that gives diffusion its special character. A ***communication channel*** is the means by which messages get from one individual to another.

There are two types of communication channels: a mass media channel and an interpersonal channel. Mass media channels are those means of transmitting messages that involve a mass medium, such as radio, television, newspaper, and so on, which enables a source of one or a few individuals to reach an audience of many. Interpersonal channels, on the other hand, involve a face-to-face exchange between two or more individuals.

More effective communication occurs when the participants are homophilous rather than heterophilous. Homophily is the degree to which individuals who interact are similar in certain attributes, such as beliefs, education, social status, and the like. On the other hand, heterophily is the degree to which individuals who interact are different in certain attributes.

1.3 Time

The time dimension is involved in diffusion (1) in the ***innovation decision process*** by which an individual passes from first knowledge of an innovation through its adoption or rejection, (2) in the ***innovativeness of an individual***—that is, the relative earliness/lateness with which an innovation is adopted—compared with other members of a system, and (3) in an innovation's ***rate of adoption*** in a system, usually measured as the number of members of the system that adopt the innovation in a given time period (Rogers, 1983: 20).

1.3.1 The Innovation Decision Process

The innovation decision process is the process through which an individual passes from first knowledge of an innovation to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision. Apparently, this process consists of a series of actions and choices over time through which an individual evaluates a new idea and decides whether or not to incorporate the new idea into ongoing practice. The innovation decision process may be divided into five main steps or stages: (1) ***knowledge***, (2) ***persuasion***, (3) ***decision***, (4) ***implementation***, and (5) ***confirmation*** (Rogers, 1983: 20, 163-165).

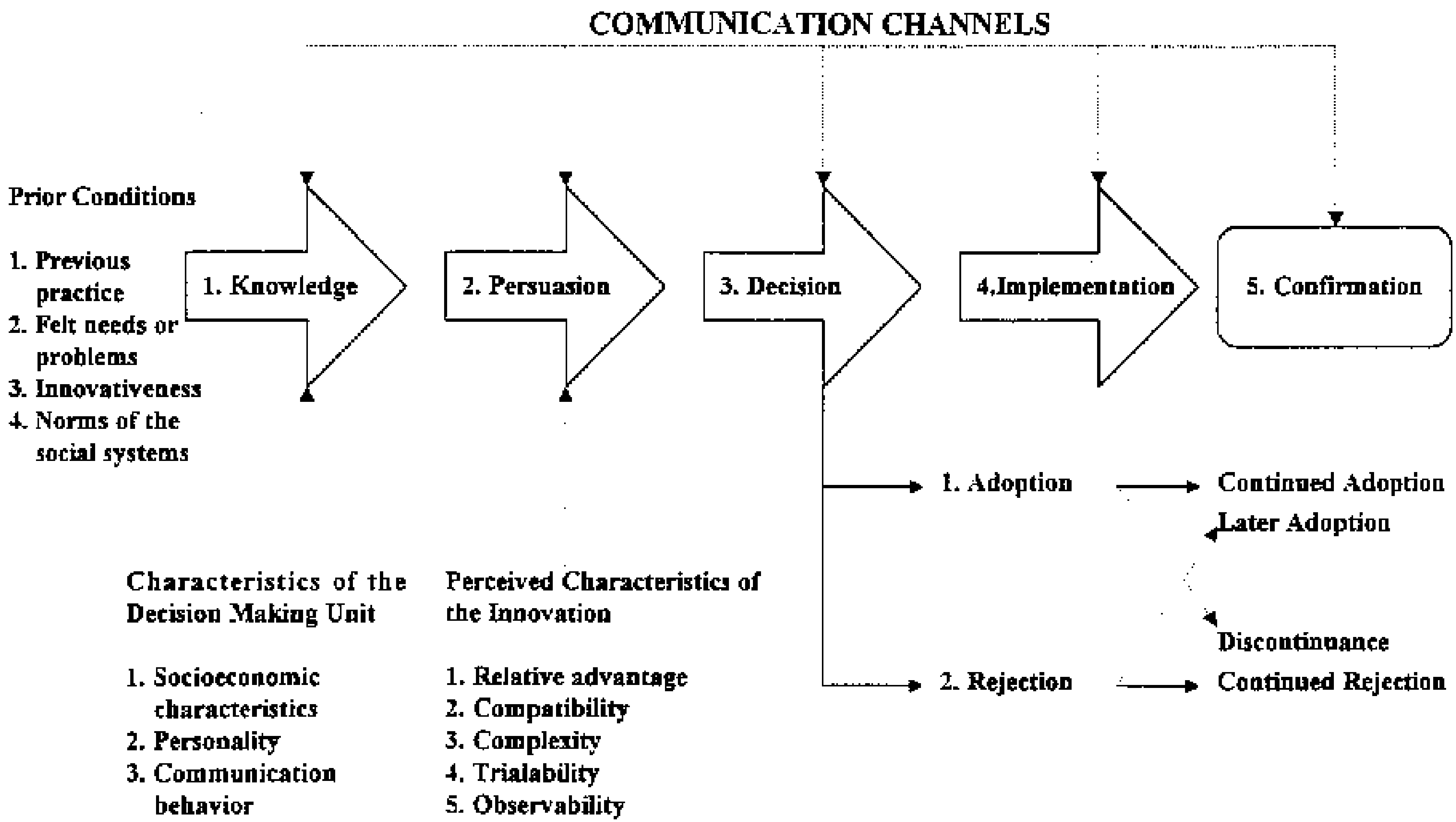


Figure 1 A Model of Stages in the Innovation Decision Process

1.3.1.1 Knowledge Stage

The innovation decision process begins with knowledge that occurs when an individual is exposed to the innovation's existence and gains some understanding of how it functions. Individuals may be aware of an innovation by accident or they may intend to seek an innovation on purpose. Knowledge of the existence of an innovation may create motivation for its adoption (Rogers, 1983: 20-21, 164-167).

1.3.1.2 Persuasion Stage

Persuasion occurs when an individual forms a favorable or unfavorable attitude toward an innovation. At this stage, individuals seek innovation-evaluation information about an innovation. They want to know the advantages and disadvantages of an innovation (Rogers, 1983: 20-21, 169-170)

1.3.1.3 Decision Stage

The decision stage in the innovation decision process occurs when an individual engages in activities that lead to a choice to adopt or reject an innovation. Adoption is a decision to make use of an innovation. Rejection is a decision not to adopt an innovation. An example of activities that result in either adoption or rejection is trying out an innovation on a partial basis to determine its usefulness. Individuals may put an innovation to the test themselves, or they may observe trials conducted by others (Rogers, 1983: 20-21, 172).

1.3.1.4 Implementation Stage

At the implementation stage, an individual puts an innovation to full-scale use. The innovation decision process sometimes terminates here, at least for some individuals. But for others, a fifth stage of confirmation may occurs (Rogers, 1983: 20-21, 174-175).

1.3.1.5 Confirmation Stage

Consequences of an innovation may or may not be what is expected. If individuals feel satisfied with an innovation, they will continue utilizing it. On the other hand, if the results of an innovation prove unsatisfactory, the innovation will get rejected. If individuals previously decided to reject an innovation, they may become exposed to pro-innovation messages, causing them to adopt the innovation later. At this stage, individuals seek reinforcement to confirm the innovation decision already made, but they may reverse this decision if they receive conflicting messages about the innovation (Rogers, 1983: 20-21, 184-186).

1.3.2 The Innovativeness of an Individual

Innovativeness is the degree to which an individual is relatively earlier in adopting new ideas than other members of a system. Not all individuals in a social system adopt an innovation at the same time. Rather, they adopt it in a time sequence, and they may be classified into adopter categories on the basis of when they first begin using a new idea. Adopters may be classified into five categories according to their innovativeness as follows: (1) ***innovators***, (2) ***early adopters***, (3) ***early majority***, (4) ***late majority***, and (5) ***laggards***.

1.3.2.1 Innovators: Venturesome

The salient value of innovators is venturesomeness. Innovators are active information seeker about new ideas. They are very eager to try new ideas. They have a high degree of mass media exposure and their interpersonal networks extend over a wide area, usually reaching outside their local system. The innovators play an important role in the diffusion process: they launch new ideas in the social system by importing the innovations from outside of the system's boundaries (Rogers, 1983: 22, 248).

1.3.2.2 Early Adopters: Respectable

Early Adopters are a more integrated part of the local system than are innovators. Whereas innovators are cosmopolites, early adopters are localites. The early adopters serve as a role model for many other members of a social system, in that the early adopters are not too far ahead of the average individuals in innovativeness. The early adopters are considered by others as "the individuals to check with" before using a new idea (Rogers, 1983: 248-249).

1.3.2.3 Early Majority: Deliberate

The early majority adopt a new idea just after the average members of a social system. They may deliberate for some time before completely adopting a new idea. The early majority's unique position between the very early and the relatively late to adopt makes them an important link in the diffusion process. They provide interconnectedness in the system's networks (Rogers, 1983: 249)

1.3.2.4 Late Majority: Skeptical

The late majority adopt a new idea just after the average members of a social system. Innovations are approached with a skeptical and cautious air, and the late majority do not adopt them until most other members of their social system have done so (Rogers, 1983: 249-250).

1.3.2.5 Laggards: Traditional

Laggards are the last in a social system to adopt an innovation. They are the most localite in their outlook of all adopter categories, many are near isolates in social networks. When laggards finally adopt an innovation, it may already have been superseded by another more recent idea that is already being used by the innovators (Rogers, 1983: 250).

These adopter categories have three main aspects of characteristics: socioeconomic, personality, and communication behavior aspects.

The earlier adopters have higher socioeconomic characteristics than do the later adopters. The earlier adopters are not different from the later adopters in age, but the earlier adopters are more educated, have higher social status, a greater degree of upward social mobility, larger-sized units, like companies, farms, and so on, a commercial rather than a subsistence economic orientation, a more favorable attitude toward credit and more specialized operations (Rogers, 1983: 251-252, 269).

The earlier adopters also differ from the later adopters in personality. The earlier adopters have a more favorable attitude toward change, education, and science. Besides, they have a higher aspiration for education, occupations, and so on, and a greater ability to cope with uncertainty and risk. The earlier adopters also have greater empathy than do the later adopters. Empathy is the ability of individuals to project themselves into the role of other people. This ability is an important quality for innovators, who must be able to think counterfactually, to be imaginative, and to take the roles of heterophilous others in order to communicate effectively with them. In addition, the earlier adopters have a greater ability to deal with abstractions, as innovators must be able to accept new ideas largely on the basis of abstract stimuli, such as ideas from the mass media. Moreover, the earlier adopters are less dogmatic and fatalistic. Dogmatism is the degree to which individuals have a relatively closed belief system. Fatalism is the degree to which individuals perceive a lack of ability to control their future. Individuals are more likely to adopt an innovation if they believe that they are in control of their future rather than think that their future is determined by fate. The earlier adopters are more rational and intelligent. Furthermore, they have higher achievement motivation, for they desire for excellence in order to attain a sense of personal accomplishment (Rogers, 1983: 257-258, 269-270)

Finally, the earlier adopters have different communication behavior from those of the later adopters. The earlier adopters have more social participation and are more likely to belong to highly interconnected systems. Furthermore, the earlier adopters are more cosmopolite. They have not only greater exposure to mass media communication channels but also more interpersonal communication channels than do the later adopters. The earlier adopters seek information about innovations more actively and thus have greater knowledge of innovations. Besides, the earlier adopters have a higher degree of opinion leadership than do the later adopters (Rogers, 1983: 257-258, 270).

1.3.3 The Rate of Adoption

The rate of adoption is the relatively speed with which an innovation is adopted by members of a social system. It is usually measured by the length of time required for a certain percentage of the members of a social system to adopt an innovation. There are five main factors that determine the rate of adoption: (1) perceived attributes of an innovation, (2) types of innovation decision, (3) communication channels, (4) the nature of a social system, and (5) the extent of change agent's promotion efforts (Rogers, 1983: 23, 232-234).

1.4 A Social System

1.4.1 Characteristics of a Social System

A social system is a set of interrelated units that are engaged in joint problem solving to accomplish a common goal. The members or units of a social system may be individuals, organizations, informal groups, and/or subsystems. All members cooperate at least to the extent of seeking to solve a common problem in order to reach a mutual goal. This sharing of a common objective binds the system together (Rogers, 1983: 24).

Norms are the established behavior patterns and serve as a guide or a standard for members of a social system. Norms can both facilitate and impede the diffusion of innovations in a social system. Some norms are opposed to change, whereas others are oriented to novelty (Rogers, 1983: 27).

Some individuals in a social system may have significant influence over others. Opinion leadership is the degree to which an individual can informally influence other individuals' attitude or overt behavior in a desired way with relative frequency. It is a type of informal leadership rather than a function of an individual's formal position or status in the system. Opinion leadership is earned and maintained by an individual's technical competence, social accessibility and conformity to the system's norms. Opinion leaders serve as a social model whose innovative behavior is imitated by other members of the system (Roger, 1983: 27-28, 271).

Individuals who intentionally influence other members' innovation decision in a direction as they wish are change agents. Change agents may be any type of individual in a social system, but they are usually such professionals as teachers, consultants, public health workers, agriculture extension agents, development workers, and salespeople (Rogers, 1983: 28, 312-313).

1.4.2 Types of Innovation Decision in a Social System

Individuals in a social system can adopt or reject an innovation either because they want to or because they are compelled to. In other words, they can adopt or reject an innovation as a result of their own decision or of the decision made by other individuals in the system. Innovation decision may be categorized into four types: (1) ***optional innovation decisions***, (2) ***collective innovation decisions***, (3) ***authority innovation decisions***, and (4) ***contingent innovation decisions*** (Rogers, 1983: 29-31).

1.4.2.1 Optional Innovation Decisions

Optional innovation decisions are choices to adopt or reject an innovation that are made by an individual independent of the decisions of other members of the social system. The distinctive aspect of optional innovation decisions is that an individual is the unit of decision making rather than the social system.

1.4.2.2 Collective Innovation Decisions

Collective innovation decisions are choices to adopt or reject an innovation that are made by consensus among the members of the system. All of the units in the system usually must conform to the system's decision once it is made.

1.4.2.3 Authority Innovation Decisions

Authority innovation decisions are choices to adopt or reject an innovation that are made by a relatively few individuals in a social system who possess power, status, or technical expertise. Other members of the system have little or no influence in the innovation decision; they simply implement the decision.

1.4.2.4 Contingent Innovation Decisions

Contingent innovation decisions are choices to adopt or reject an innovation that can be made only after a prior innovation decision. The distinctive aspect of contingent innovation decision making is that two (or more) tandem decisions are required; either of the innovation decisions may be optional, collective, or authority.

1.4.3 Consequences of an Innovation in a Social System

The eventual end of the diffusion of an innovation is its consequences. Consequences are the changes that occur to an individual or to a social system as a result of the adoption or rejection of an innovation. Not only can an innovation affect the individuals who adopt it, but it can also influence other members in a social system. In other words, an innovation may have an effect on virtually everybody, if not all, in a social system, no matter whether they are the adopters or not. Consequences may be categorized into three dimensions as follows: (1) ***desirable versus undesirable***, (2) ***direct versus indirect***, and (3) ***anticipated versus unanticipated*** (Rogers, 1983: 3, 379-380).

1.4.3.1 Desirable Versus Undesirable Consequences

An innovation does not contribute its consequences to members in a social system equally. It is possible for an innovation to produce desirable effects to some individuals and undesirable effects to others. Desirable consequences are the functional effects of an innovation to an individual or to a social system while undesirable consequences are the dysfunctional effects of an innovation to an individual or to a social system (Rogers, 1983: 380-381).

1.4.3.2 Direct Versus Indirect Consequences

Because of the intricate interrelationships among the elements in a social system, a change in one part of the system often initiates a chain reaction of indirect consequences stemming from the direct consequences of an innovation. Direct consequences are the changes to an individual or to a social system that occur in immediate response to an innovation. Indirect consequences are the changes to an individual or to a social system that occur as a result of the direct consequences of an innovation (Rogers, 1983: 384-385).

1.4.3.3 Anticipated Versus Unanticipated Consequences

The main reason that individuals adopt an innovation is that they want to obtain the expected consequences generated by the innovation. However, there is no guarantee that an innovation will always result in what the adopters expect. Unforeseen effects may arise. Anticipated consequences are the changes due to an innovation that are recognized and intended by the adopters. Unanticipated consequences are the changes due to an innovation that are neither recognized or intended by the adopters (Rogers, 1983: 387-388).

2. Computers

A computer is an electronic device that can accept data, apply a series of logical operations, and supply the results of these operations as information (Atkin, 1980: 6). Like any other machine, a computer is used because it does certain jobs better and more efficiently than humans. It is the incredible speed of computers, along with accuracy, which makes them so useful and valuable.

Computers have had a profound impact on modern society and have caused many changes in a relatively short time. During their first existence in the late 1930s, computers were mainly used by specialists in limited fields. But the computer technology has developed so rapidly that it is now used by virtually all kinds of people in society. In the past, only big firms could afford the computer technology, but now the same state-of-the-art technology can be found everywhere - in microbusiness companies, retail stores, libraries, school, universities, and the home. The widespread availability of computers has in all probability changed the world forever. It is a versatile technology; the benefits computers can provide depend on how they are used, and now they are widely applied for many different purposes.

Students can put the computer technology to good use for their studies. Their three most frequent used computer applications are: (1) the use of computers for writing assignments, (2) the use of computers for calculation, and (3) the use of computers for information retrieval.

2.1 The Use of Computers for Writing Assignments

Word processors permit a computer to be used as an electronic typewriter in which the user can compose a manuscript and view it on the screen, make corrections, move passages around, delete and insert texts, and in general perform all tasks of writing and rewriting. Word processing is probably the most common task a computer is put to. Today many students use a computer for their writing assignments. Through word processors, beautiful documents can be easily made. The outstanding advantage of using word processing is that after written material has been entered, it can be easily edited and changed. There is no need to repeat the whole process or to retype if the writer wants to make changes, as would be the case of writing by typewriting or by hand. Only changes need to be retyped. The users can reorganize the text at will. Word processors also offer such useful features that the conventional pencil and paper method cannot as fonts, paper formats, and spelling and grammar checking. There is a variety of striking characters to choose to make the writing assignment attractive. Different types of writing assignment needs different types of paper formats. The users can easily select the right one that suits the job in question. Some software provides a word checker which can pick up words that are (accidentally) misstyped. This feature can generate a misspelling-free paper. Several programs are able to check and correct grammar errors. Some even have a Thesaurus built in to help find an alternate word, antonym or synonym. Other beauties of word processors include printing of headers and footnotes, and the automatic creation of tables of contents, indexes, cross-references and page numbering.

2.2 The Use of Computers for Calculation

The statistical analysis of data has been dramatically affected by computers. Today, virtually no complex statistical analysis is performed by hand. Most statistical analyses are now performed by a computer. A computer can calculate both rapidly and accurately. Another benefit of most statistical programs is the flexibility to report and present existing data. When it comes to making graphs or charts, these programs can present the same data in differing graph or chart styles for the users to opt for the best one that is appropriate to the task. Even if the data are changed, the programs will automatically upgrade the graphs of charts. These abilities make a computer a valuable tool for doing research which inevitably involves complex mathematical analyses.

2.3 The Use of Computers for Information Retrieval

A computer can put data into its memory and retrieve them in a few millionths of a second. It can also have a storage capacity for as many as a million items, resulting in a tremendous amount of information that can be searched. That is why now many universities are equipped with computers for students to use for the retrieval of information. Many universities install computers in their libraries for this service. Although the same information can be retrieved manually using card catalogs, the retrieval by computer is far better. It can take only a few minutes to retrieve all the desired information by computer, compared to hours that would otherwise be spent using the physical card catalogs.

Many universities are also planning to install the networking system, which will permit the students to search information from not only other domestic libraries but also other libraries worldwide. Computer networks will link computers, allowing data to be exchanged rapidly and reliably. In addition, the students will be able to obtain such service from their home computer at any time of the day from the comfort of their home. Those who have a personal computer at home can access the system through a telephone line. Besides the usual services like library search, database search, electronic mail, file transfer, special applications are now being developed and created for student university communication such as submitting homework, grade posting, grade analysis, class cancellation and make-up announcements as well as payment of fees through the system.

In the globalized society of the 21st century, the computer technology will drive change just as surely as manufacturing drove change in the industrial era. In the not too distant future, computers will not only function like what they do now but also will serve as a television, telephone, notetaker, fax machine, mailbox, appointment calendar, and so on (Naisbitt, 1994: 56-57). And computers will continue to revolutionize the form of studying further.

3. Related Studies

Somyat Kumpala (1994 106-108) conducted a research about the adoption of computer use in investigation of the sub inspector investigators under the Metropolitan Constabulary Division. The findings revealed that approximately half of the subjects (50.98%) did not adopt a computer for their work, that one-third (33.34%) adopted the computer use, and that the rest (15.68%) were of the opinion that they were willing to try using a computer for their work. Among tested variables, only knowledge about computers was found to be significantly associated with the adoption of computer use

Campbell's study (1993: 1004-A) was conducted under a multivariable innovation framework which examined relevant organizational climate dimensions, individual leader characteristics, and top management team variables. The innovation index used as the criterion measure was developed based on Rogers' five adoption categories. The tested variables fell within three categories/levels: organizational, group/team, and individual. The organizational variables included the innovation as the dependent variables and the climate dimensions of open-mindedness, readiness to innovate, and questioning authority as the independent variables. The tested individual and team factors included seven background demographic variables and two personality characteristics, locus of control, and cognitive style in terms of adoption-innovation. The analysis of data suggested that there was indeed a positive association between innovation and the internal climate as measured by open-mindedness readiness to innovate and questioning authority. The results also supported that top management team characteristics, as a group, were strong predictors of the innovation. Demographic variables were found to be able to predict the innovation partially.

Scott's research (1993: 1014-A) investigated how individuals interpreted a specific aspect of their work environment and how this interpretation related to their innovative behavior. The research sample comprised 189 engineers technicians, and scientists employed in a large central R&D facility of a major US industrial corporation. The study found that the strongest predictors of innovative behavior were individual characteristics and attributes. No support was found for a situationalist perspective on innovative behavior, and minimal support was found for an interactionist perspective.

Flagg (1992: 2492-A) conducted a study to determine the status of computer use by teachers in fourteen comprehensive high schools at the District of Columbia, focusing on purpose, extent of use, and factors affecting use. The findings indicated that the main instructional purposes of computer use were drills to help students practice the skills related to their specific subjects and word processing. Among factors contributing to computer use were a positive attitude toward computers and the perception of their own knowledge about computers. Factors inhibiting computer use were insufficient computers, printers, and software, high student/computer ratio, inadequate financial support from the school district, difficulty in incorporating computers in the curriculum, lack of enough time for developing lessons that use computers, and problems scheduling different teachers' classes. The recommendations of the study proposed word processing requirements for all high school students and pointed out that more computers, printers, and software should be supplied.

Forsythe (1991: 514-A) conducted a research to identify characteristics of teachers of graduate courses who adopted computers. The findings showed seven predictor variables that had a significant relationship to computer acceptance: (1) computer anxiety, (2) computer confidence, (3) computer knowledge and skills, (4) accessibility to computer hardware, (5) hands-on experience, (6) frequency of computer use, and (7) duration on computer use.

Faseyitan (1991: 138-A) studied the relationship between personal attributes, organizational and attitudinal factors, and the adoption of computers in university instruction. The research sample consisted of 257 full-time faculty members from the rank of instructor to the rank of full professor from six state university in Ohio. The findings indicated that attitudinal factors, consisting of personal efficacy utility beliefs and attitude toward computers, in combination with discipline and incentives accounted for a significant amount of variance in predicting the adoption of computers for instruction. Incentives showed a negative rather than a positive relationship.

The purpose of Carr's study (1991: 3543-A) was to investigate what affected the network television newsroom adoption of computers. The five tested independent variables were perceived attributes of the innovation, types of decision-making, communication channels, nature of social system, and efforts of change agents. Three hypotheses were drawn from Rogers' theory. The first hypothesis, that early and late adopters of an innovation had different perceptions of that innovation, was not supported. The second, that the relative contributions of the five variables to the rate of adoption might be determined, was not supported, either. The third, that perceived attributes accounted for the greatest percentage of relative contribution, was supported. This study indicated that even though computers were perceived as appropriate to broadcast newsgathering, television newsrooms would adopt computers only when they could afford them.

The intent of Thomas' study (1991: 2719-A) was to examine how individuals selected alternatives to information problems, and to study relationships that might exist between this choice behavior and prevailing attitudinal, perceptual, experiential or demographic characteristics of those same individuals. Significant results indicated that the effective implementation of information technology required that decision makers had: (1)

prior experience in use of computers during the individual's career; (2) current frequent and direct use of computer workstations; (3) knowledge of the attributes of the concept of End-User Computing; (4) perceived direct benefits of information technology projects; (5) perceived top management support of End-User Computing; (6) involvement in the planning of information technology projects; (7) perceived positive image of the data processing department; (8) knowledge of the technological options available to them from the perspective of the contribution of these options to the effectiveness of business procedures.

The investigation of Waggoner (1989: 350-351-A) was designed to assess what factors influenced College of Education and Allied Professions faculty members' attainment of computer literacy skills at the University of Toledo. The following findings were revealed in the study: (1) Departmental assignment was found to have an influence on faculty members' computer literacy attainment; (2) Faculty members' access to computers was positively correlated with computer literacy attainment; (3) Faculty members with extensive mathematical backgrounds were found to have attained higher levels of computer literacy than those without an extensive mathematical backgrounds; (4) Faculty members ages were found to be negatively correlated with computer literacy attainment; (5) Females faculty members attained greater levels of computer literacy than males faculty members; (6) Faculty members' proximity to an avid computer user was positively correlated with computer literacy attainment; and (7) Faculty members' attitude was positively correlated with computer literacy attainment.

Janiwan M. Skulkhu (1990: 3497-A) investigated and analyzed computer literacy and general attitudes toward computers of students at Thai public universities. The research sample consisted of 492 students who took at least one computer course from thirteen public universities in Thailand. Based on the research findings, the following conclusions were drawn: (1) Thai universities students exhibited a moderate computer literacy level; (2) Male and female students were found to have similar computer literacy levels, (3) Graduate students had higher computer literacy levels than did other students from different educational levels; (4) Students majoring in education displayed higher computer literacy levels than those majoring in mathematics and majors. (5) Students with higher GPAs had higher levels of computer literacy than those with lower GPAs; (6) Computer literacy was not age dependent; (7) Generally, Thai university students showed positive attitudes toward computers; (8) Males and females both showed positive attitudes toward computers; (9) Graduate students exhibited more positive attitudes toward computers than all other groups; (10) Students with lower GPAs displayed lower positive attitudes toward computers; (11) There was a strong positive relationship between students' knowledge and their attitudes toward computers.

Pullen (1993, 1328-A) studied the writing performance of third grade female students who used a microcomputer word processor and who used the conventional pencil and paper method. The independent variables were the writing tools while the dependent variables were fluency word length, sentence length, unique words, T-units, readability score and content quality. Significant differences favoring the computer generated compositions were indicated for the total numbers of words, unique words, and T-units. However, no significant differences were found for word length, sentence length, readability and content quality. The findings indicated that writing tools had an effect on writing fluency and provided support for the use of microcomputer word processors in elementary classrooms.

Maness (1993; 3897-A) conducted a research, using Delphi technique, to establish a national consensus of computer competencies for educators using nationally representative authorities. Identification of panelists was based on the following criteria: (1) active professional involvement in education and educational technology, (2) active in publication and/or presentation of educational technology; and (3) balanced representation of one of ten identified regions of the United States of America. The researcher identified five domains of computer competencies for educators: (1) hardware skills; (2) software skills; (3) programming skills; (4) integration skills, and (5) general knowledge skills. The panelists were asked to generate competency statements in each domain. The results revealed forty-eight essential computer competencies for educators. The index of essential skills included competencies from all domains except the programming one. Among the conclusions reached by the researcher were as follows: (1) a dynamic foundation of computer competencies for educators did exist; (2) the body of competencies deemed essential was relatively comprehensive and conveyed the expectation of continuing professional development; and (3) for educators, the most vital computer competencies were directly related to the instructional process.

Shawareb's dissertation (1993: 767-A) was aimed to investigate student attitudes toward computers and computer use and to determine the effects of gender, previous computer experience, age, and teacher attitudes toward computers on student attitudes. It was found that gender had an effect on student attitudes; males scored significantly higher than females. Computer ownership and previous experience with computers had a positive effect on attitude. Older students had a more positive attitude than younger students. Finally, there was a positive correlation between teacher attitudes and student attitudes.

Pornpimon Cheamnakarin (1993: 2262-A) explored the attitudes and perceptions of faculty members in Rajamanagala Institute of Technology (RIT), Thailand. The purposes of this study were to (1) determine which demographic variables were associated with faculty member attitudes toward the implementation of computers in higher education in Thailand, and (2) determine perceptions among faculty members toward barriers to the widespread use of computers. Two hundred and four faculty members from twenty nine campuses and the main campus at Rajamanagala Institute of Technology, Thailand, participated in this study. The major findings of this study were: (1) Faculty members who worked in administration and those who were teachers differed in their attitudes toward institutional support for computer applications; (2) Faculty members' years of experience to college teachings were related to their attitudes toward computer applications in education; (3) The major barriers regarding the use of computers in school were lack of budgeted funds, lack of administrative support, and lack of computer hardware and software.

Yuthana Sariya (1992: 4302-A) investigated Thai college students' attitudes toward computers at the beginning and the end of a computer literacy course. Specific attention was given to the relationship between attitudes and gender, major, and prior computer experience. The instrument used in this study, the Computer Attitude Scale, consisted of forty items organized into four subscales: anxiety, confidence, liking, and usefulness. The subjects were 120 college students randomly selected from Eastern University, Cholburi, Thailand during the summer session of 1990. The subjects were assigned to an either experimental group or a control group; each group contained twenty-eight science majors and thirty-two non-science majors. The experimental group received instruction in a computer literacy course for ten consecutive weeks. The control group did not attend the course. Attitudinal data were collected for both groups at the beginning and the end of the course. The results of data analysis revealed the following: (1) A positive change in attitudes toward computers was found in the experimental group on three of the four subscales; (2) A positive change in attitudes toward computers was found in the control group on all four subscales; (3) The computer literacy course did not appear to have a differential effects on students' attitudes toward computers; (4) gender and major did not appear to be related to change in students' attitudes toward computers; (5) prior computer experience did appear to be related to change in students' attitudes toward computers. Students with high school computer class experience were more likely to express more positive attitudes toward computers.

O' Neal (1989: 3556-A) examined the relationship between student attitudes toward computers and gender, program placement , and having a home computer. The research sample consisted of 1005 students in seventh grade from three middle schools in Palm Beach County, Florida. The results showed no significant relationship between student attitudes toward computers and gender, no significant relationship between student attitudes toward computers and program placement, and a significant relationship between student attitudes toward computers and having a computer at home.

Pisarn Mongkolsaosuk (1989: 261) examined the opinions of the forth year students of Chulalongkorn University concerning the utilization of computers for education. The findings indicated that most students approved the role of computers in Thai education. They viewed computers as indispensable to educational work, for example, educational administration, teaching and studying, and educational researches. Most students were of the opinion that computer literacy was essential and that emphasis on computers should be put at higher education, especially in the year of studying. They believed that the course should focus on package programs. They also thought that graduates who had computer knowledge would have better working opportunities than those who did not. Difficulty with computers was mainly due to the lack of computers and computer personnel.

Khemacha Suwannakul (1988: 231) investigated the opinions of teachers, students and parents concerning computer learning in secondary schools under the jurisdiction of the Department of General Education, Bangkok Metropolis. The research findings showed: (1) Teachers, students, and parents strongly agreed that computers would be increasingly used in the future and that computer knowledge was a must, which would lead to increased working opportunities; (2) All three groups viewed that computers contributed to the habit of working systematically, of step by step planning, and of creative thinking; (3) All three groups wanted the schools to provide basic knowledge of computers, and skills of applying computers for the students' future careers; and (4) computer knowledge should be taught as a selective course.

Oliver's case study (1993: 1325-A) sought to identify the attitudes of faculty members toward computers at Rust College, to identify computer users and non-users among the faculty, to determine the relationship between individual and institutional factors to the adoption and maintenance of desired faculty computer behavior, and to provide administrators with baseline data to aid in their planning, designing, and evaluation of faculty computer development programs. The study population comprised fifty-two full-time faculty members. The findings revealed that computer access and use were widespread among the faculty. Most had favorable attitudes toward computers. Many owned computers, and the majority had computers in their offices. Communication was high among users who were learning through colleague interaction. Word processing was the most frequent use of computers. Administrative support for computer literacy was high, and many faculty members had received computer training. Supervisors offered computer training but experienced difficulty with budgetary and personal computing limitations. Computer integration was not deliberately planned across all divisions and curricula. To sum up, the faculty of Rust College had a positive attitudes toward computers and was making extensive use of computers.

Gilbertson's qualitative study (1993: 4287-A) described the diffusion of the computer as an innovation over a ten year period in one rural school district in Washington state. A case study strategy was used to collect data from the school district. Nine conclusions were drawn from the findings: (1) Innovators believed that education could benefit as much from technology as society had benefited; (2) Software decisions should come before hardware decisions; (3) Computers were complex innovations because they involved both software and hardware decision; (4) Computers were complex innovations because they were used differently with each curriculum area; (5) Computers were complex because they were an open-ended innovation used by innovators; (6)

Planning for the diffusion of computers in education should be done within or among curriculum areas; (7) Computer supported existing educational philosophy; (8) Administrative support was a key to successful change; and (9) computers generated new curriculum.

The purpose of the study of O' Donnell's study (1992: 3584-A) was to assess teachers' self-perceived level of skills and needs for computer training after receiving computer awareness training. A self-report questionnaire was administered to 728 K-12 teachers of the Hacienda-La Puente Unified School District. The conclusions of this study were that teachers desired to integrate computers into the classroom instruction but did not possess the skills. Computer use among the respondents was low, computers were not being utilized to their fullest extent and teachers' needs to use computers were different at different levels of instruction.

Fulkerth's study (1992: 3160-A) was undertaken in order to provide a picture of the adoption processes of a typical community college, Roberts Community College (a pseudonym), so that the findings might be generalized to other such schools. The findings of this study revealed that the adoption of computer use by Roberts Community College had been primarily evolutionary. Computer and resources in this school developed as an outgrowth of administrative computing, and early academic use occurred in areas of computer programming, business, science, and mathematics. The computer use recently began to occur in other areas of the curriculum. One such use was in the Writing Lab, a facility where students could find supported assistance in using computers to complete compositions. This educational community regarded itself as having low awareness of computer programs and resources not only on its own campus, but also on computer issues in general. This concern was voiced by administrators, teachers, and staff; however, they were uniformly clear that they wished to become more aware by receiving training on computer use and related educational computer matters. At the time of this study, an open-entry computer lab for the entire campus community was being put into operation. This lab came into existence partially because resources were available, but another factor was the success of the Writing Lab due to its visibility and educational impact.

Crow (1992: 2764-A) examined faculty information technology perceptions regarding the adequacy of computing resources, the importance of computing resources, and instructional computing. This study found that although faculty did not feel highly competent in computing, they were interested in and liked computing. They used computers a lot, and that usage continued to increase. Personal computers were extremely important to faculty, and they felt that they had fairly good access to them. However, they felt that the university should provide better access to personal computers for students. Faculty thought that networking was important for both them and their students, but that the university networking access was too limited. Faculty felt that their work and that of their students would have improved if they had had better access to and support for computing and networking.

Vrana (1989: 3693-A) investigated four areas related to microcomputer use by faculty in social science disciplines at institutions of higher education. The four areas were: (1) What factors that influenced a faculty member's decision to use and continue using a microcomputer; (2) How those microcomputers were used by faculty; (3) Whether faculty microcomputer users were then change advocates for the use of microcomputer technology; and (4) What differences that existed in the use of microcomputers among community college, four-year college, and comprehensive university faculty. The sample comprised 501 faculty members of twenty-five institutions of higher education in the social science disciplines. The twenty-five institutions, all located in a southwestern state, consisted of two comprehensive universities, ten four-year colleges, and thirteen community colleges. Most faculty indicated that having word processing capabilities was the reason they began to use microcomputers. Faculty microcomputer users actively encouraged colleges to use microcomputers but did not tend to read microcomputer-related literature. Discussion about increased productivity from using a microcomputer with peers resulted in trying a microcomputer of faculty members. Most never took any college courses or workshops to learn about microcomputers. The most significant difference found among different types of colleges was in the brands of computers used.

Armistead's study (1990: 2712-A) described the current status of computer usage for administrative purposes by the senior high school principals in the public schools of the commonwealth of Virginia. The research sample comprised 238 senior high school principals, 216 of whom used computers for administrative purposes. Approximately one-third of the senior high school principals responding to the matter of time saving by use of computers stated that such usage had freed them from routine paperwork. Principals further reported that their freed time was being devoted to a wide variety of acts that, in the main, may be characterized by classroom observation and instructional improvement tasks. However, nearly one-half of the principals reported that the chief effect of computer usage had been an improvement in the quality and accuracy of their work.

Kanokratt Pornphicanel (1988: 229-230) studied the utilization of computers for education in educational institutions in Eastern Seaboard in academic year 1988. The conclusions of the study were: (1) Most educational institutions did not have computers. Only few used computers and suffered from insufficient computers; (2) Most personnel wanted to use computers but did not possess the knowledge to use them; (3) Most educational institutions did not have policies supporting the computer applications, but the institutions that had computers had policies to supply more computers and to support the computer use; (4) The educational institutions as a whole had no budgets for computers; (5) Most personnel believed that the institutions were not ready to adopt computers due to lack of budgets and computers technicians but agreed that the students should have computer knowledge and that there should be policies to support computer use; and (6) Personnel strongly agreed that computers were modern technologies and that computer literacy was vital.

Kittipong Panomwan Na Ayudthaya (1987: 217-218) examined the state, needs, and problems concerning the utilization of computers for education of private vocational schools in Bangkok. The findings revealed that while administrators believed that the schools had sufficient computers, teachers and students wanted the school to provide more computers. Administrators and students' needs of using computers increased. The schools needed more computer teachers. The problems about using computers arose from the outdated computers, which were considered inappropriate for today's use and the lack of such peripheral equipment as printers, computer paper, and sources for further study about computers.

Brosnan (1990: 1912-A) assessed teachers' computer skills to establish base-line data from which teachers could identify the skills they had and the skills they needed in order to meet the new demands within their profession. The population of the study included all 725 full-time elementary and secondary teachers in the School of District of the city of Erie, Pennsylvania. The base-line data which emerged from this study revealed that teachers' computer skill strengths were in the areas of general computer usage and word processing. Approximately 80% of all teacher respondents claimed to have no experience with data base spreadsheet or graphic applications. The teachers viewed computers as curriculum supplements and professional tools. They recognized that they had poor computer skills, and were willing to learn. Some of the deterrents reported were time, inefficient and ineffective inservice programs, lack of relationship to specific curricular areas, lack of equipment, and lack of in-house technical assistance.

Pimonpan's dissertation (1987) on the adoption of computers in Thai university libraries used Everett M. Rogers' innovation-decision model as a framework to differentiate between the adopter and non-adopter groups. The findings revealed that the adopters tended to 1) have more professional staff; 2) have higher academic degrees; 3) have more people involved in making the decisions; 4) be cosmopolitan--having studied abroad, having traveled abroad and having had more exposure to external information sources abroad—; 5) have more professional experiences; 6) have more library technical equipment and 7) have higher degree of positive attitude towards computer technology. The variables which were found not to be statistically significant as predictor variables to separate group differences were: collection size of books and the like of the library, the budget size of the library, the number of people involved in the final approval and the existence of a committee for planning automation projects. The data analysis indicated that the adoption process of computer technology in Thai university libraries was at the "Knowledge" stage and that most library administrators needed more in-depth information and knowledge about computer technology.

The purpose of Hightower's dissertation (1992: 546-A) was to investigate whether Rogers' model was valid in organizational settings. Four major components of the model were tested to find out (1) whether there were distinct stages in the decision process and whether they followed the correct sequence; (2) whether potential adopters used communication channels in a manner consistent with the model; (3) whether potential adopters used information sources in a manner consistent with the model; and (4) whether potential adopters evaluated the innovation on Rogers' five innovation attributes. Data were collected by interview and questionnaire from faculty members in the College of Business and College of Law at Georgia State University. The analysis suggested that the stages of the model were necessary and sufficient to describe the subjects' decision process. Also, the stages occurred in the order proposed by Rogers. The relative importance of communication channels was found to be in the direction that the model suggested, but the results were not statistically significant. Partial support was found for the model's description of the use of information sources. Of the five innovation attributes proposed by Rogers, relative advantage was found to discriminate between adopters and non-adopters by factor analysis.

The major conclusions drawn from the related studies reviewed above were as follows:

1. Individual characteristics and relative advantage were strong predictors of the innovation.

2. Perceived benefits, experience and knowledge about computers, accessibility to computers, and computer ownership were related to attitudes toward computer use.

3. Factors that impeded the adoption of computers were difficulty in access to computers, knowledge about computers, and lack of administrative support.

4. Contradictory findings about the association between gender and age and attitudes toward computer applications.

5. Many individuals had favorable attitudes toward computers.

6. Scholars perceived the benefits of computers.

7. Word processing was considered as an effective tool by both students and teachers.

8. Many individuals wanted to use computers but lacked the skills.

CHAPTER III

METHODOLOGY

1. The Population and Sampling

The population of this study consisted of all students who were studying in the School of Social Development of the National Institute of Development Administration in Bangkok in October, 1994, during which the researcher conducted this research

There were two types of the School's students: students of the regular program and students of the special program. Students of the regular program who were still studying at that time were mainly students of the 13th, 14th, 15th, 16th, 17th, and 18th class. Each class comprised an average of twenty-five students, therefore, all students of the regular program who were studying when this study was conducted made up approximately 150 students. Of these students, students of the 17th and 18th class had not yet studied SD. 502 (Computers for Social Development) Most students of the special program who were also studying in October, 1994, were students of the 3rd and 4th class. Only students of the 4th class had not yet taken SD 502 when the research was carried out. On the average, each class of the special programs had approximately no less than one hundred students, so two classes of theses students accounted for more than two hundred students. Therefore, the population of this study consisted of approximately at least 350 students.

The two-stage sampling technique was used to gather the research sample The first step was the stratified sampling method. It was used to divide the School's students into two parts according to their types of students: those of the regular program and those of the special program. A sample of one hundred students was set for each type of students. The next procedure was the accidental or convenience sampling technique. This technique was opted for two main reasons. The first reason was that the population was not very large. The other reason was that if the simple random sampling had been used, some students might have misunderstood and believed that they were chosen because of certain reasons, leading to feeling uneasy to answer the questionnaire according to the truth.

Two hundred questionnaires were distributed; approximately 150 were returned. Fifty more questionnaires were then distributed. This time only twenty-three were returned. Accordingly, the research sample consisted 173 students.

2. The Instrument

Questionnaires were constructed to gather data from the subjects. They were pre-tested once. Most questions were closed-ended. Two Likert-type scales were developed to measure innovativeness and attitude toward computers.

The scale constructed to measure innovativeness consisted of fourteen questions, which covered six characteristics of innovativeness: fatalism, feelings about change, exposure to information, achievement motivation, venturesomeness, and dogmatism.

Each of the characteristics above was measured by the following questions.
Fatalism was measured by question 6.1 and 6.10.
Feelings about change was measured by question 6.2, 6.5, and 6.13.
Exposure to information was measured by question 6.3.
Achievement motivation was measured by question 6.4, 6.7 and 6.14.
Venturesomeness was measured by question 6.6 and 6.12.
Dogmatism was measured by question 6.8 and 6.11.

There were two types of questions: the first one had a positive tone to innovativeness while the other one had a negative tone. The system of scoring for questions that had a positive tone to innovativeness was as follows:

An answer of "highly disagree" received 1 point.
An answer of "disagree" received 2 points
An answer of "agree" received 4 points.
An answer of "highly agree" received 5 points.

For a question which had a negative tone to innovativeness, the score scheme was reversed.

An answer of "highly disagree" received 5 point.
An answer of "disagree" received 4 points
An answer of "agree" received 2 points.
An answer of "highly agree" received 1 points.

Summary scores on the scale ranged from 14 to 70. This scale was tested on the basis of Cronbach's alpha model; its reliability coefficient was .79.

Twenty-seven Likert-style questions in section IV of the questionnaire were used to measure attitude toward computers. This scale covered three constructs usefulness, fondness, and practice.

Each of these three characteristics was measured by the following questions:

Usefulness was measured by question 1, 3, 4, 5, 7, 8, 9, 10, 11, 14, 15, 20, 21, 22, 23, 25, and 26.

Fondness was measured by question 2, 6, 12, 17, 18, and 27

Practice was measured by question 13, 16, 19, and 24.

Its system of scoring was the same as that of innovativeness. The scores ranged from 27 to 135. Based on Cronbach's alpha model, the reliability coefficient of this scale was .92.

3. Conceptual Framework

Based on Rogers' theory of the diffusion of innovations and the related studies reviewed above, the researcher formulated the following conceptual framework.

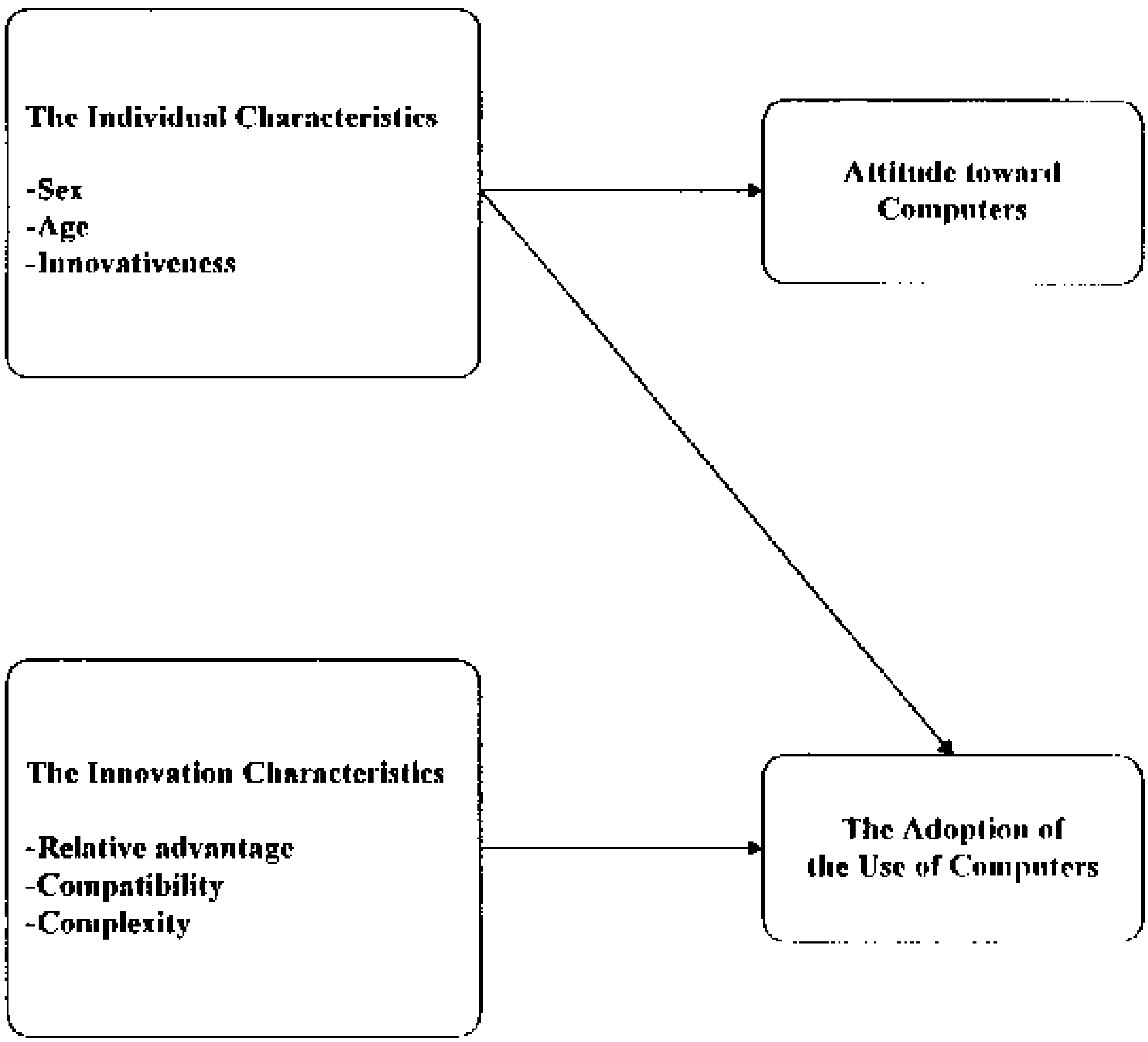


Figure 2 The Conceptual Framework

4. Hypotheses

The following hypotheses were constructed to guide the study:

Hypothesis 1 There was an association between attitude toward computers and individual's characteristics

Hypothesis 2 There was an association between the adoption of the use of computers and individual's characteristics along with characteristics of the innovation.

5. Data Analysis Procedures

Both univariate and multivariate statistics were used to analyze the data. The arithmetic mean, standard deviation, and percentage were used to describe the data. The chi-square statistic was used to test independence between categorical variables while Pearson's r was used to investigate relationship between interval variables. Stepwise regression was used when a dependent variable was an interval variable. In case that the dependent variable was a dichotomous variable, the forward stepwise logistic regression was performed. A discriminant analysis was carried out to predict membership in a categorical variable having more than two groups. The Kruskal-Wallis one-way analysis of variance, a nonparametric procedure, was used when the data were ordinal.

All of these procedures were performed through a computer using the SPSS program.

6. Operational Definitions

The School referred to the School of Social Development of the National Institute of Development Administration

Students referred to students of the School of Social Development of the National Institute of Development Administration in Bangkok.

SD. 502 referred to the course of Computers for Social Development

Students who had a job at the low level referred to ordinary employees and civil servants of class 2, 3 or 4.

Students who had a job at the middle level referred to foremen, supervisors and civil servants of class 5 or 6.

Students who had a job at the high level referred company owners, managers and civil servants of class 7 or 8.

Innovativeness referred to a combination of six characteristics. fatalism, feelings about change, exposure to information, achievement motivation, venturesomeness, and dogmatism

Relative advantage referred to the degree to which a computer was perceived as better than other related tools or machines

Compatibility referred to the degree to which a computer was perceived as applicable to the students' tasks.

Complexity referred to the degree to which a computer was perceived as difficult to understand and use

CHAPTER IV

ANALYSIS OF DATA

1. Characteristics of the Sample

The sample consisted of 173 students. The majority of the respondents (63.6 %) were students of the normal program. The rest (36.4 %) were students of the special program.

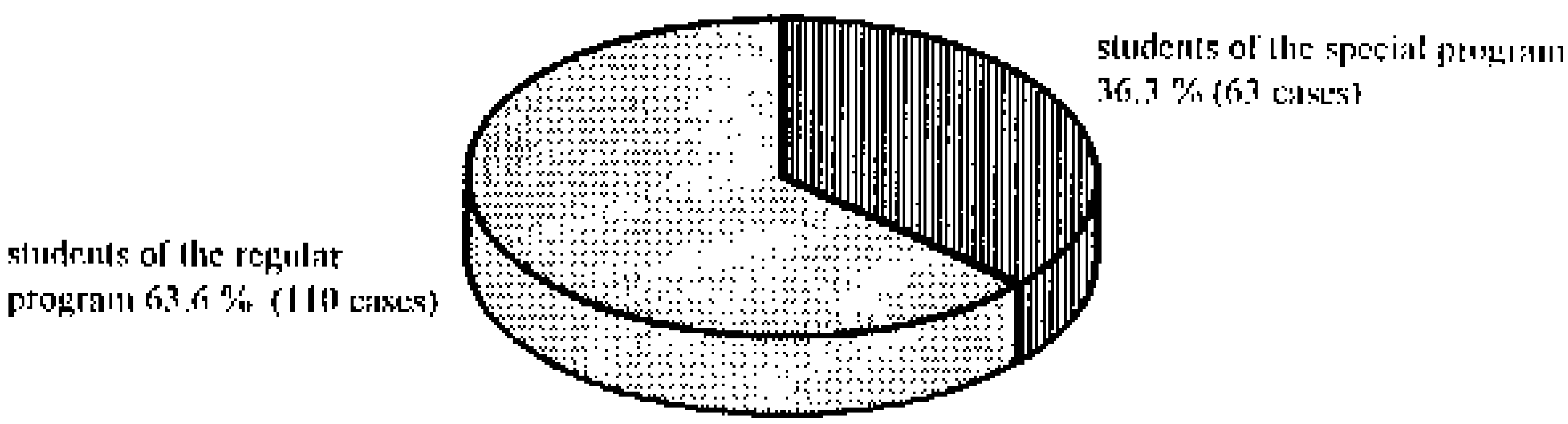


Figure 3 Types of Students

There were almost equal numbers of male and female students in the sample 88 (50.9 %) were male; 85 (49.1 %) were female.

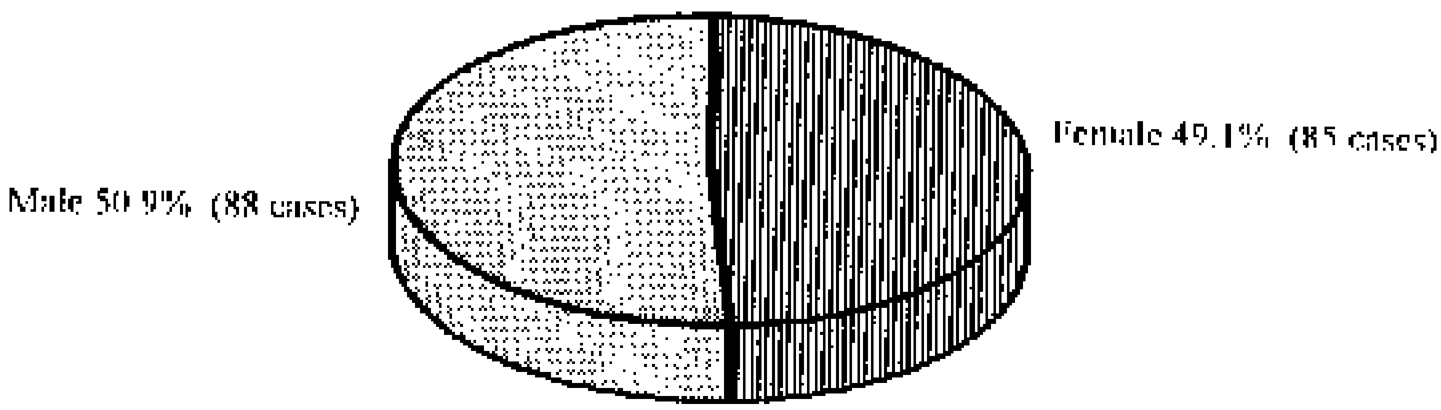


Figure 4 Sex of the Respondents

Among all students, the youngest student was 22 while the oldest was 58. The average age of the students was 33.65. The median was 34, indicating that half of all students were over 34 years old. 37 % (the 37th percentile) of the sample were younger than 30, and 17 % (the 83rd percentile) were older than 40.

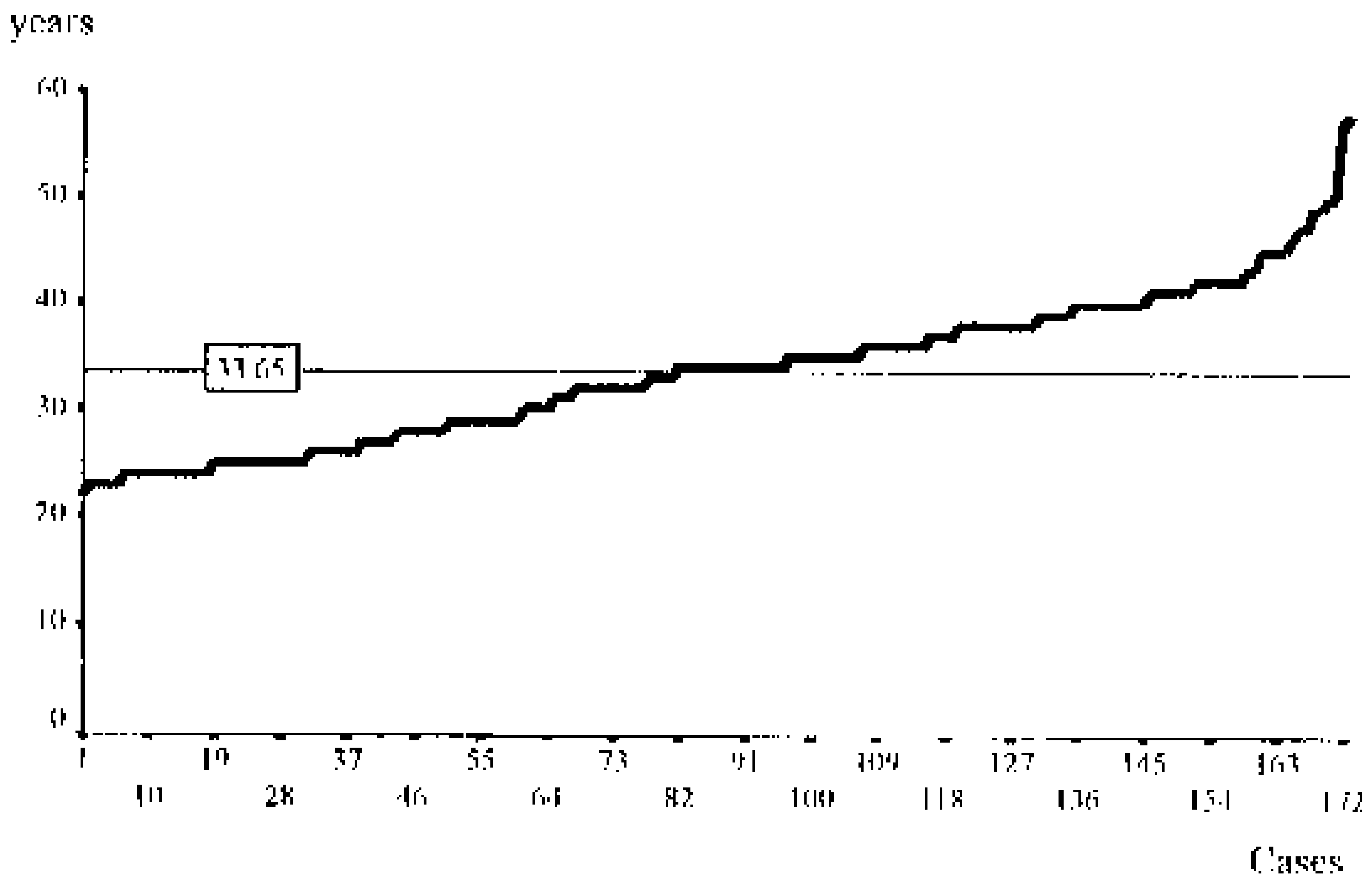


Figure 5 Age

Almost half of the students questioned (49.7 %) were single. Married students accounted for 45.8 %. A mere 3.5 % of the sample were seperated, divorced or widowed.

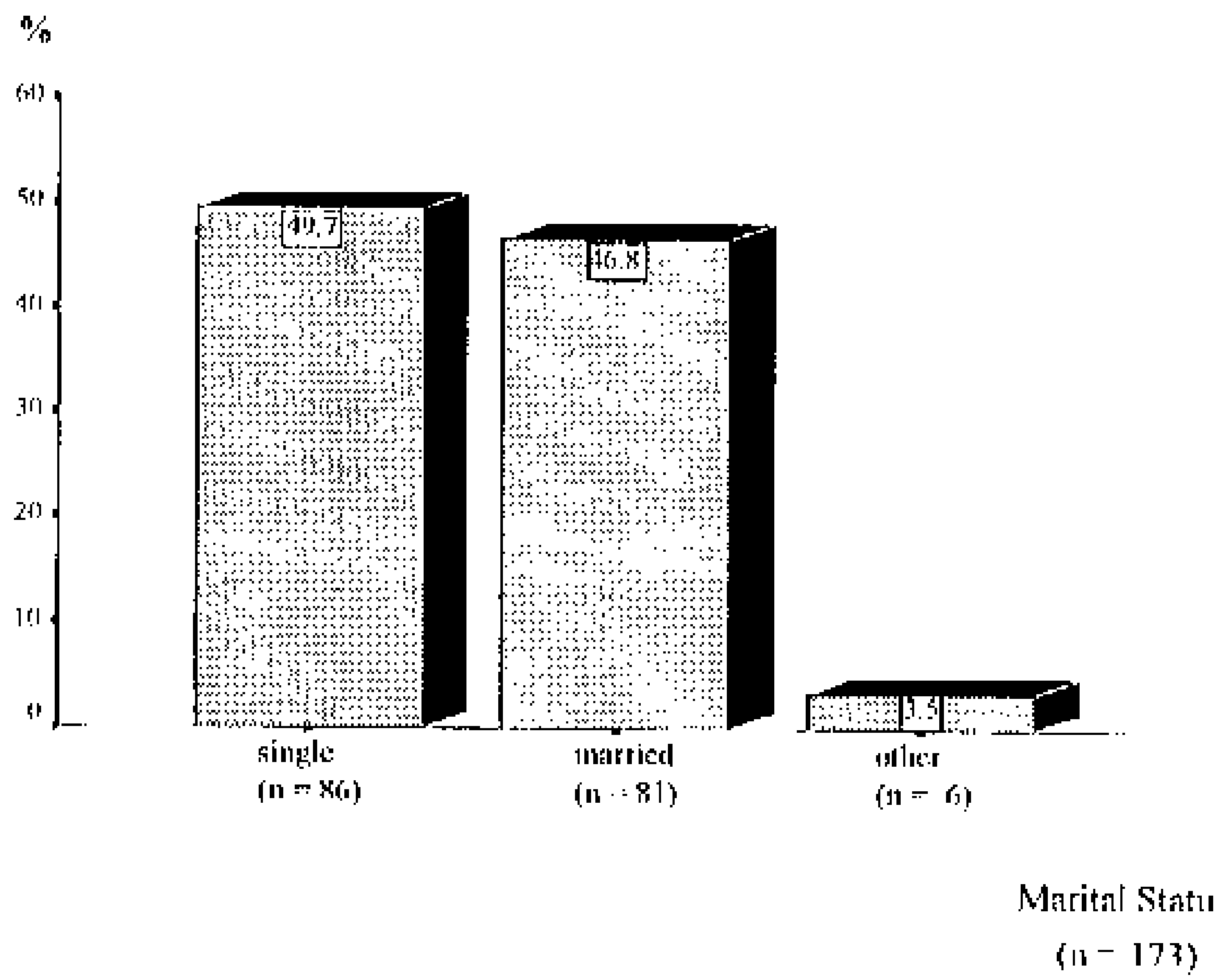


Figure 6 Marital Status

Most students (45.3 %) both studied and worked while 34.3 % were on study leave. 11 % quit their jobs in order to study, and 9.3 % never worked.

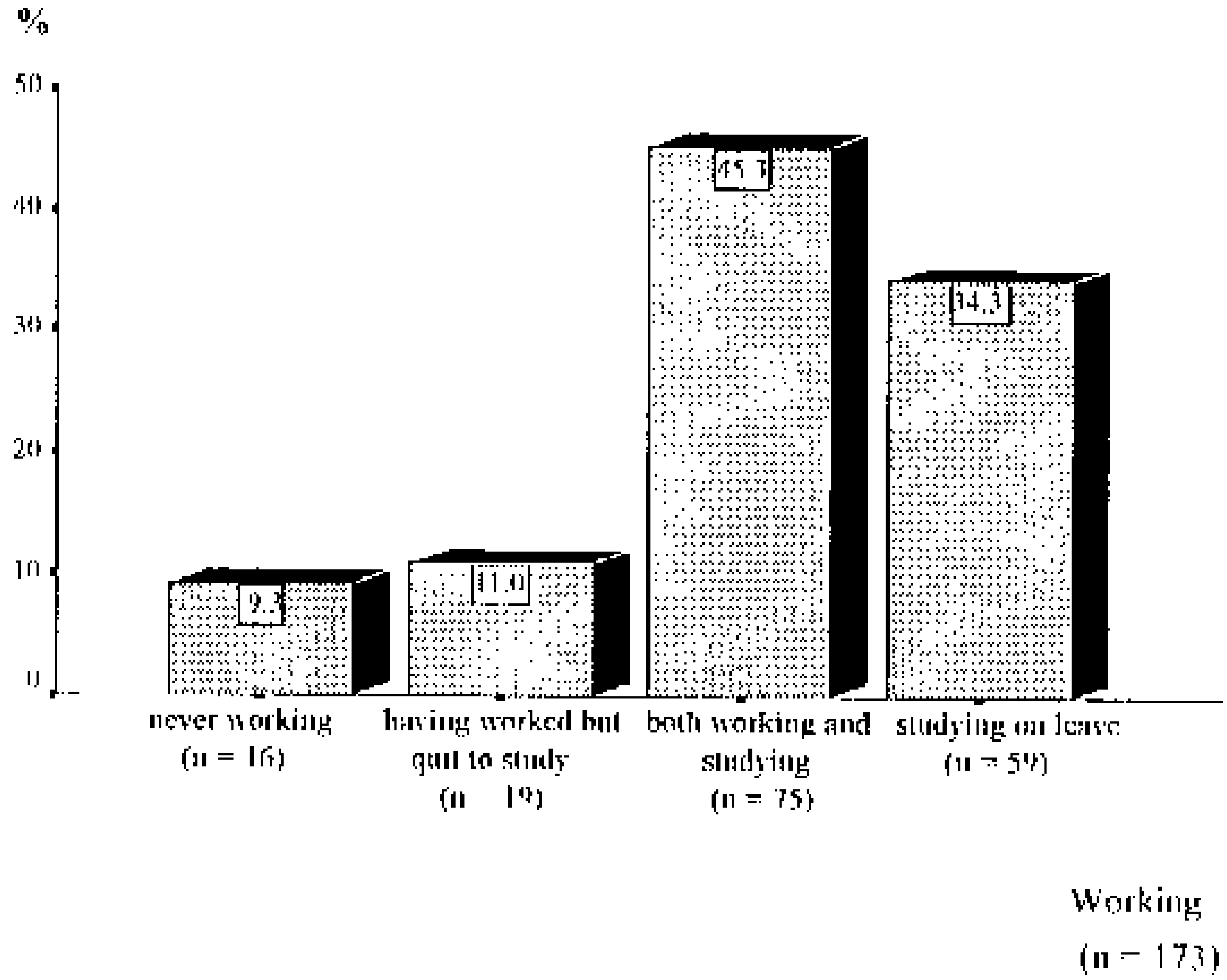


Figure 7 Students' Working

The average income of students who did not work while studying was approximately 4,600 baths a month. Those who had a job at the low level (e.g. ordinary employees and civil servants of class 2, 3 or 4) earned about 9,600 baths a month. Students with a job at the middle level (e.g. foremen, supervisors and civil servants of class 5 or 6) made almost 12,000 baths a month. Students with a job at the high level (e.g. company owners, managers and civil officers of class 7 or 8) earned most; their average salary was about 25,000 bahts a month.

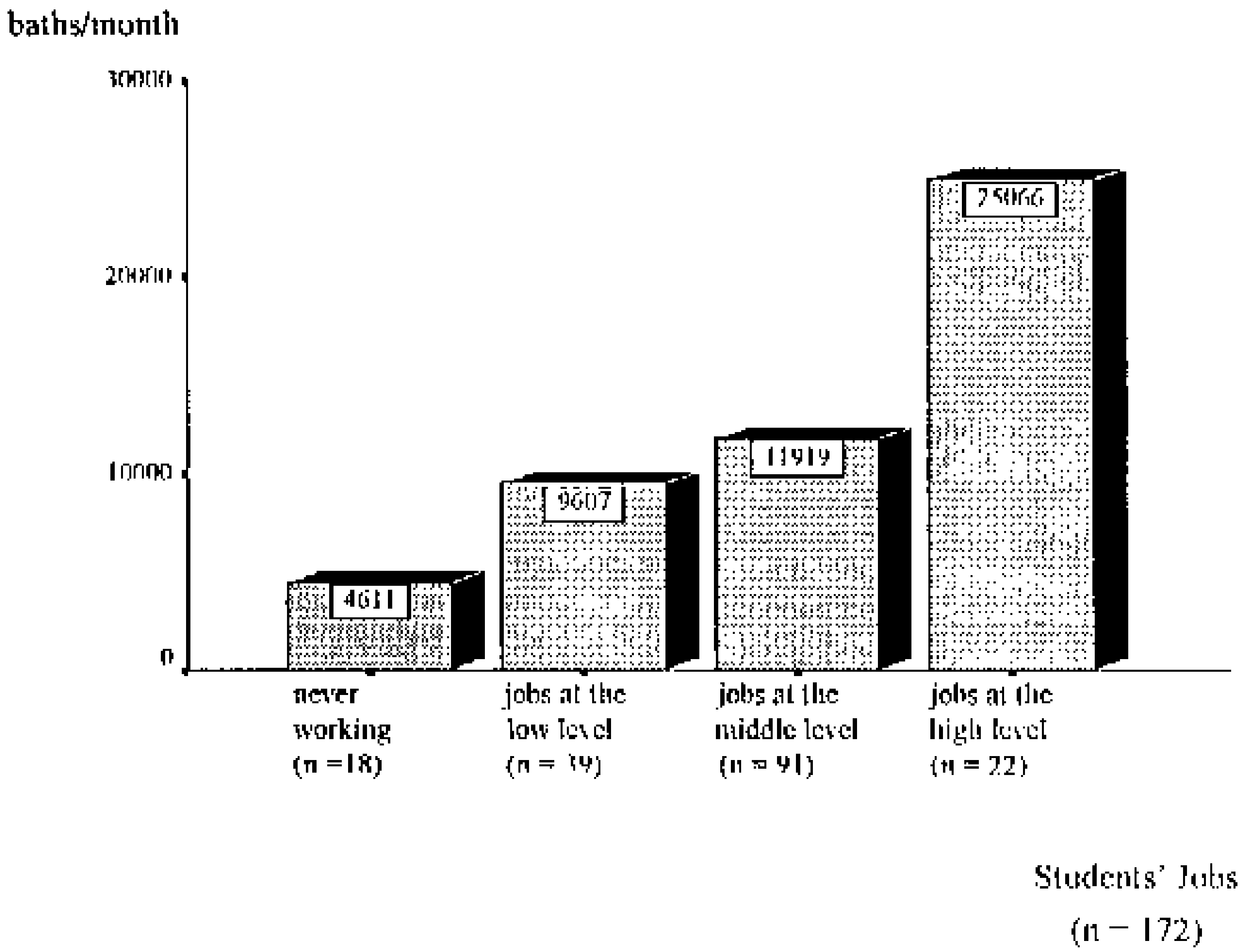


Figure 8 Income by Students' Jobs

About three-forths (74.0 %) of the students did not have a home computer. Those who had a home computer represented 26 %, which were made up of 17.3 % of those who were the owners of the home computer and 8.7 % of those who were not

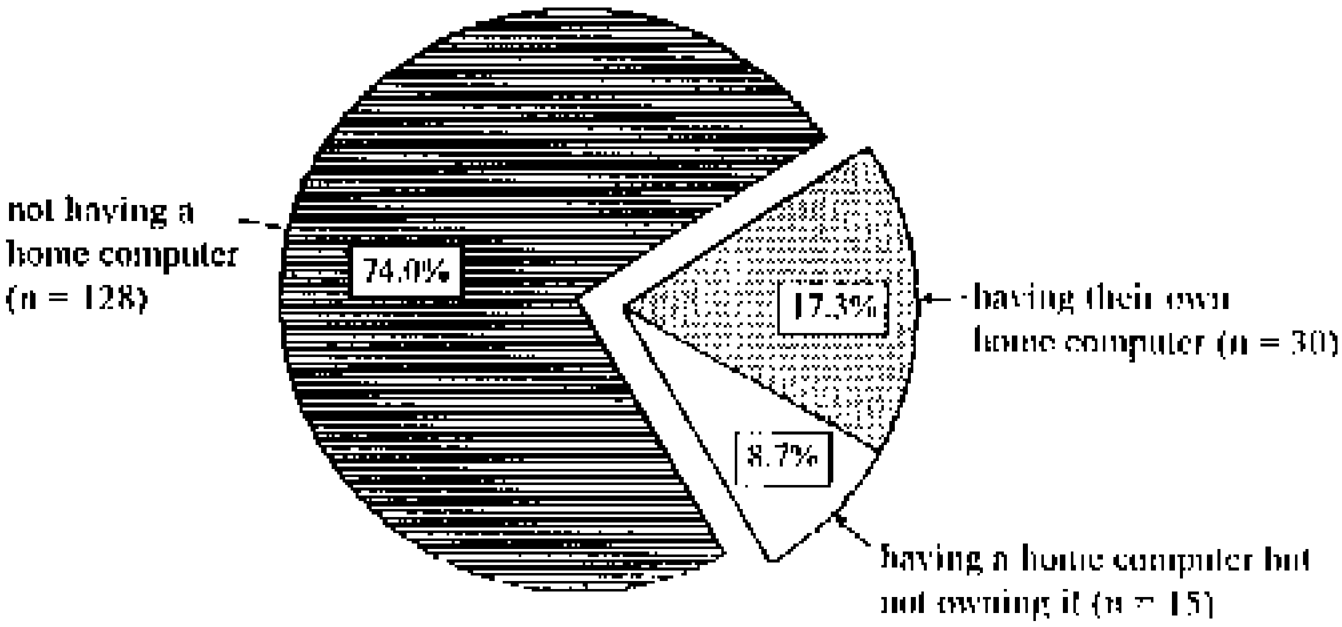


Figure 9 Home Computers

Table 1 Innovativeness and Attitude toward Computers

Variable	mean	standard deviation	n
Innovativeness	3.83	.57	173
Attitude toward computers regarding usefulness	4.16	.54	170
Attitude toward computers regarding fondness	3.57	.52	170
Attitude toward computers regarding practice	4.02	.75	170
Overall attitude toward computers	4.08	.56	170

Innovativeness was a combination of six characteristics: fatalism, feelings about changes, exposure to information, achievement motivation, venturesomeness, and dogmatism. On the average, students' innovativeness was at the rather high level (mean = 3.83)

Attitude toward computers was measured by a combination of three constructs: usefulness, fondness, and practice. The construct that had the highest average was usefulness of computers. Its mean was 4.16, indicating the high level of attitude. The next highest average was that of practice about computers. Its mean was 4.02, also indicating the high level of attitude. Fondness of computers had the lowest average, 3.57, indicating the moderate level. Overall, the students' attitude toward computers had the mean of 4.08, showing the high level.

In order to find out whether attitude toward computers had an association with individual's characteristics, a stepwise regression analysis was performed between attitude toward computers as the dependent variable and sex, age, and innovativeness as the independent variables.

Table 2 Means and Standard Deviation of the Independent Variables in the Regression Analysis of Attitude toward Computers

Independent variables	Mean	Standard deviation
Sex (male = 1)	0.503	0.502
Age	33.67	7.35
Innovativeness	53.66	8.18

Table 3 Correlation Coefficients Among Independent Variables

	Age	Innovativeness
Sex	.100	.018
Age		-.191

Table 4 Results of the Regression Analysis

Independent variables	B	Beta	T	p
Innovativeness	1.0907	.5910	9.181	.0000
(Constant)	51.6123		8.002	.0000

R^2 = .3493

Adjusted R^2 = .3451

F = 84.28

p = .0000

159 valid cases were included in the analysis. There were almost equal numbers of male and female students. No pairs of the independent variables were very strongly associated. The highest correlation coefficient was -.191 for the relationship between age and innovativeness.

Only innovativeness was selected in the regression model. It could explain approximately 35 % of the observed variation in attitude toward computers. Higher levels of innovativeness were associated with higher levels of favorable attitude toward computers.

2. Characteristics of the Innovation

About nine-tenths (35.1 % and 55.5 % combined) of all students regarded computers as rather useful or extremely useful; the rest thought otherwise. Concerning whether a computer could be applied for their tasks, 14.6 % said a computer was more or less compatible, 36.3 % believed that they could use a computer for their tasks quite a lot, and 43.3 % considered a computer a very applicable tool. The percentages for those who felt that very incompatible and a little compatible were very small (2.3 % and 3.5 %, respectively).

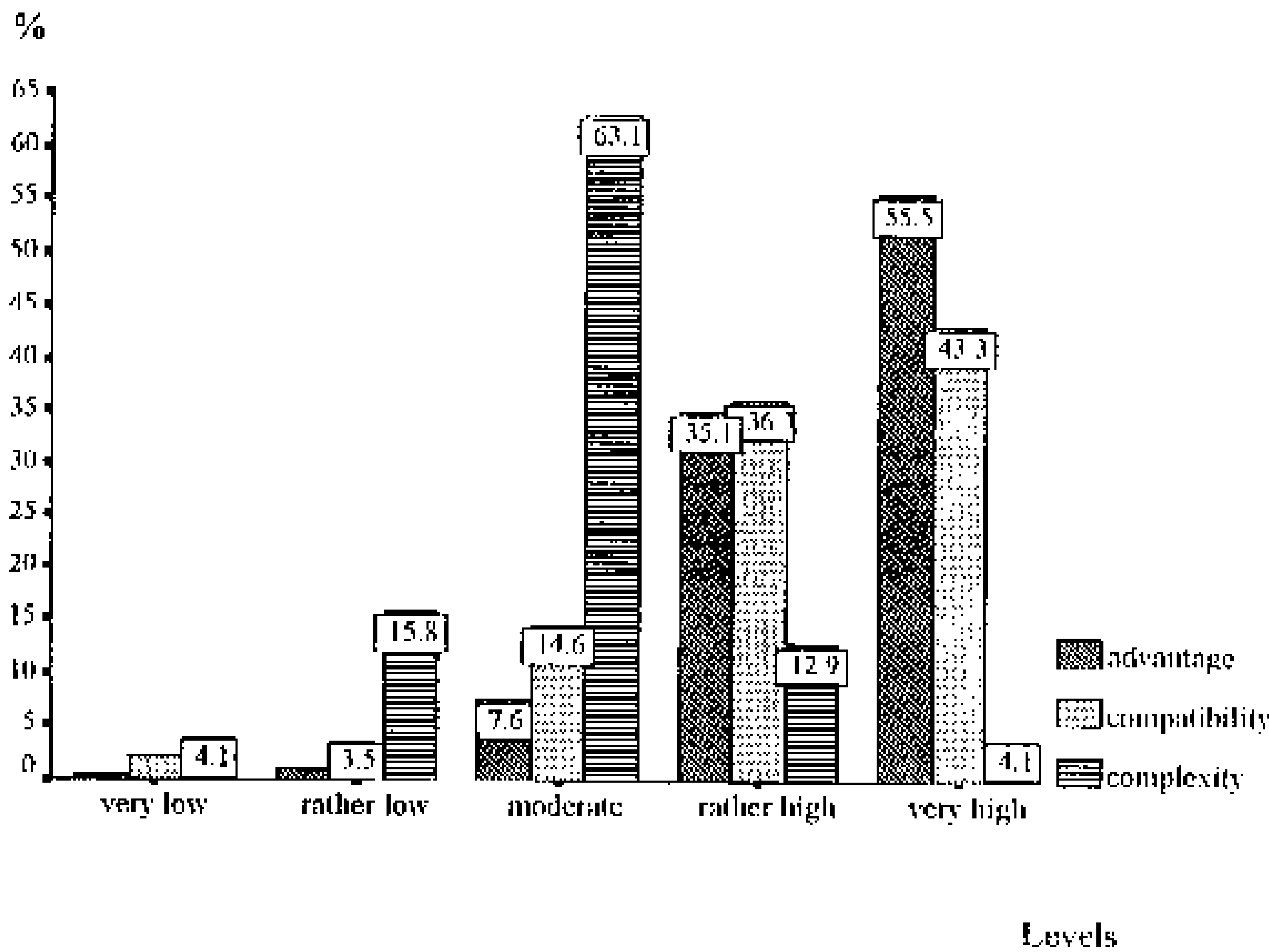


Figure 10 The Perceived Relative Advantage, Compatibility and Complexity of Computers

More than half (63.1 %) reported that using a computer was neither too difficult nor too easy. It was found that 4.1 % commented that it was very easy to use a computer, and that was exactly the same numbers of students who believed the reverse. There were also nearly identical numbers of those who said using a computer was rather easy (15.8 %) and of those who said using a computer was rather difficult (12.9 %).

3. The Adoption of the Use of Computers

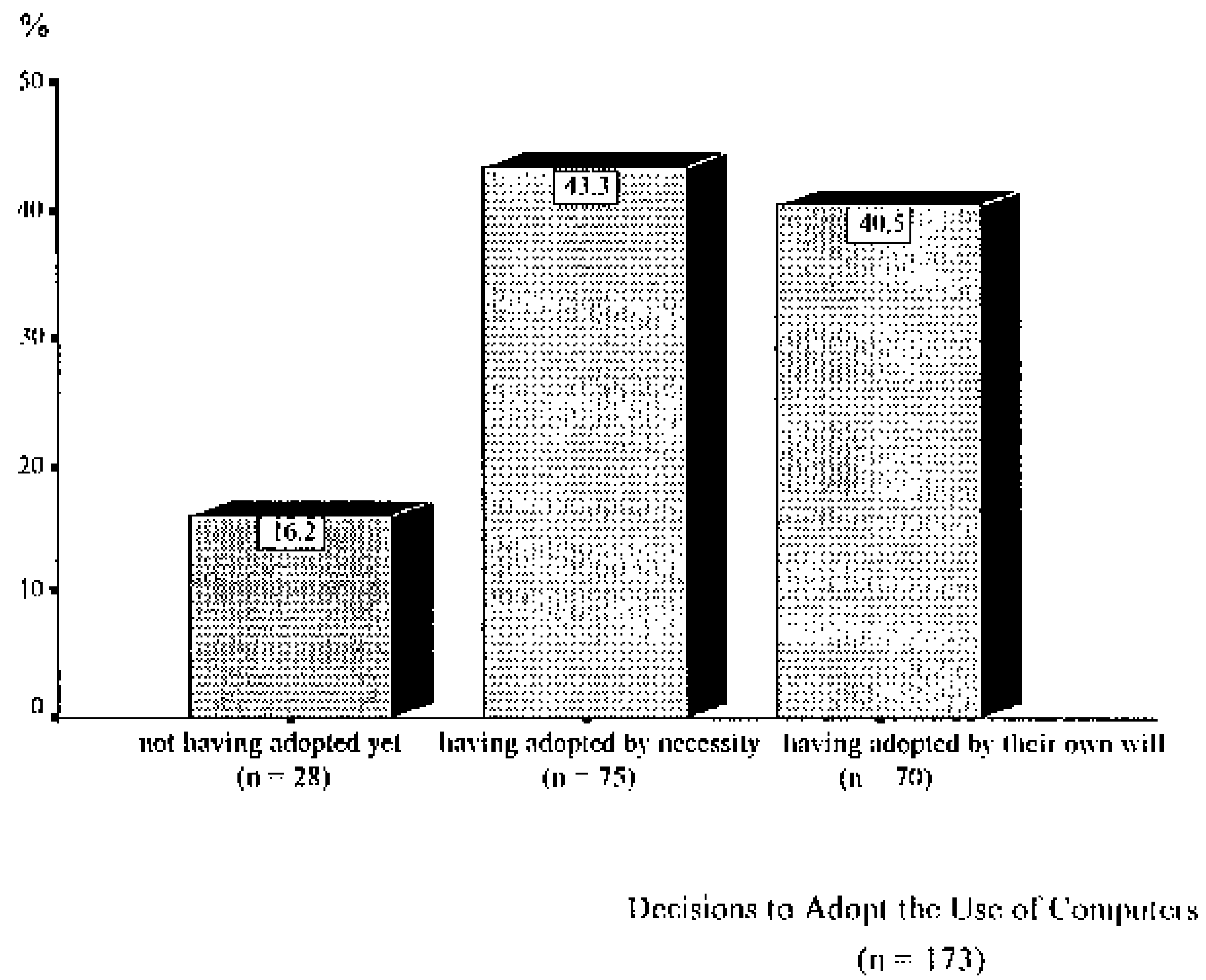


Figure 11 Decisions to Adopt the Use of Computers

Most students (43.3 %) adopted the computer use by necessity. In other words, they put a computer into use because they had to. Their decisions to adopt this innovation were named "authority decisions," according to Rogers' theory of diffusion of the innovation. Those students who adopted the use of computers by their own will accounted for 40.5 %. They were independent of whether or not to adopt the computer innovation. Their choices were called "optional decisions." Only 16.2 % had not yet adopted the use of computers.

A discriminant analysis was performed to examine differences among these three groups of students.

Table 5 Means and Standard Deviations in the Discriminant Analysis for Prediction of Types of the Adoption on the Basis of the Discriminating Variables

Discriminating variables	Grouping variable					
	Not having adopted (n = 22)		Having adopted through the authority decision (n = 73)		Having adopted through the optional decision (n = 63)	
	mean	S.D	mean	S.D	mean	S.D
Age	36.41	7.25	36.12	7.29	30.01	5.83
Attitude	100.04	15.19	107.08	16.32	117.22	9.81
Innovativeness	51.23	6.43	51.27	8.99	57.28	6.38
Advantage	4.31	0.89	4.27	0.78	4.36	0.76
Compatibility	3.91	1.06	3.81	1.13	3.90	1.08
Complexity	3.13	0.35	3.20	0.66	3.08	0.65

Table 6 Results of the Discriminant Function Analysis

Discriminating variables	Correlations of discriminating variables with canonical discriminant functions		Univariate F (2, 155)
	Function 1	function 2	
Age	-.71907	.27709	15.9171 *
Attitude	.69816	.60412	15.7192 *
Innovativeness	.61061	-.29161	11.5501 *
Complexity	-.24160	-.10982	.6848
Compatibility	.23995	.20035	.1525
Advantage	.14514	.34609	.2223
Canonical correlations	.5309	.1747	
Eigenvalues	.3925	.0315	
Relative advantage	92.57 %	7.43 %	

* p < .01

Table 7 Unstandardized Canonical Discriminant Function Coefficients of the Variables Included in the Model

Variables	Function 1
Age	-.0980763
Innovativeness	.0428613
Attitude	.0332559
(Constant)	-2.6552203

Table 8 Standardized Canonical Discriminant Function Coefficients of the Variables Included in the Model

Variables	Function 1
Age	-.66080
Innovativeness	.33056
Attitude	.46264

Table 9 Canonical Discriminant Function Evaluated at Group Means (Group Centroids)

Groups	Function 1
Not having adopted	-.70332
Having adopted through the authority decision	-.43927
Having adopted through the optional decision	.75460

Table 10 Residual Discrimination and Test of Significance

Functions derived	Wilk's lambda	Chi-square	Degrees of freedom	Significance
0	.696190	55.769	6	.0000
1	.969467	4.775	2	.0918

A discriminant function analysis was performed using six variables as predictors of membership in three groups. The six predictor variables were: age, attitude toward computers, levels of innovativeness, the perceived relative advantage of computers, the perceived compatibility of computers and the perceived complexity of using computers. The three groups were: 1) students who had not yet adopted the use of computers; 2) students who had already adopted the use of computers through the authority decision; and 3) students who had already adopted the use of computers through the optional decision.

Of the original 173 cases, 15 cases were dropped from the analysis owing to missing data. Two discriminant functions were calculated, with a combined χ^2 (6) = 55.77, $p < .01$. After the removal of the first function, the remained discriminating power was not statistically significant, χ^2 (2) = 4.775, p = .091. The two discriminant functions accounted for 92.57 % and 7.43 %, respectively, of the between group variability. Therefore, only the first discriminant function was sufficient to discriminate among the three groups. The group of students who had adopted the use of computers through the authority decision was midway between the group of students who had adopted the computer use through the optional decision and the group of students who had not yet adopted the computer use on a single dimension comprising age, attitude toward computers and levels of innovativeness.

The strongest contribution came from students' age, followed by attitude toward computers and levels of innovativeness. Their standardized canonical discriminant function coefficients were -.66080, .46264 and .33056 respectively.

The group of students who had adopted the use of computers through the optional decision had the highest group centroid (.75460). The group of students who had adopted the use of computers through the authority decision and the group of students who had not yet adopted the use of computers had the value of group centroids of -.43927 and -.70332 respectively.

Students who had adopted the use of computers through the optional decision seemed to be very young and more innovative and have a high positive attitude toward computers, whereas students who had not yet adopted the use of computers appeared to be rather old and less innovative and have a low positive attitude toward computers. Students who had adopted the use of computers through the authority decision fell between these opposite sets of attributes. In other words, they were neither very young nor very old. Their levels of innovativeness and of attitude toward computers were of average magnitude.

With the use of equal prior probability for all groups (33.33 %), the overall percentage of cases classified correctly was 57.23 %. Most students in the group of those who had adopted the computer use through the optional decision were correctly classified (71.9%). Students who had adopted the computer use through the authority decision were least likely to be correctly identified; only 45.2 % were correctly classified. This indicated that the three discriminating variables (age, attitude toward computers and levels of innovativeness) could classify the three groups of students, but the improvement in prediction was not considerable, compared to the prediction rate based on chance alone.

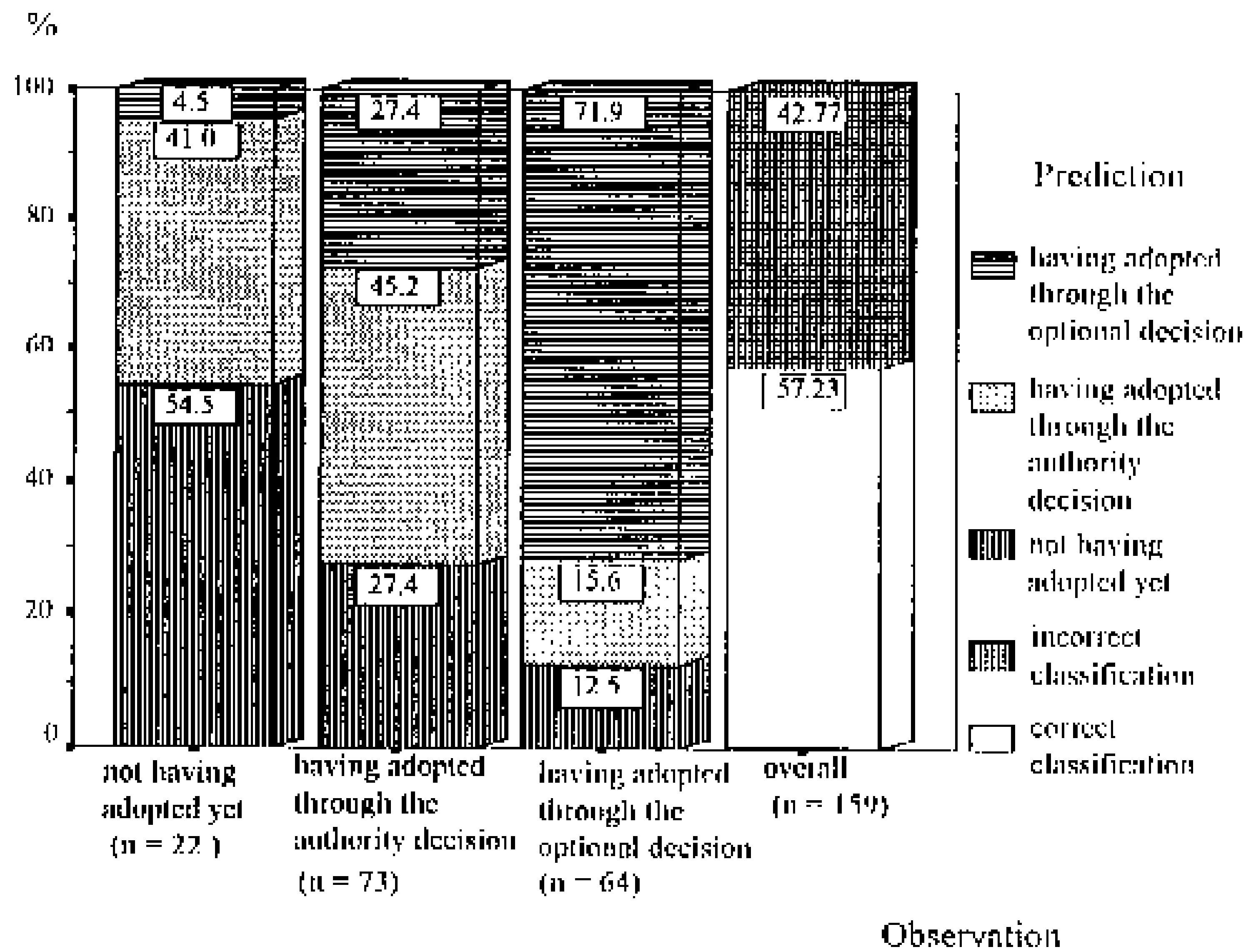
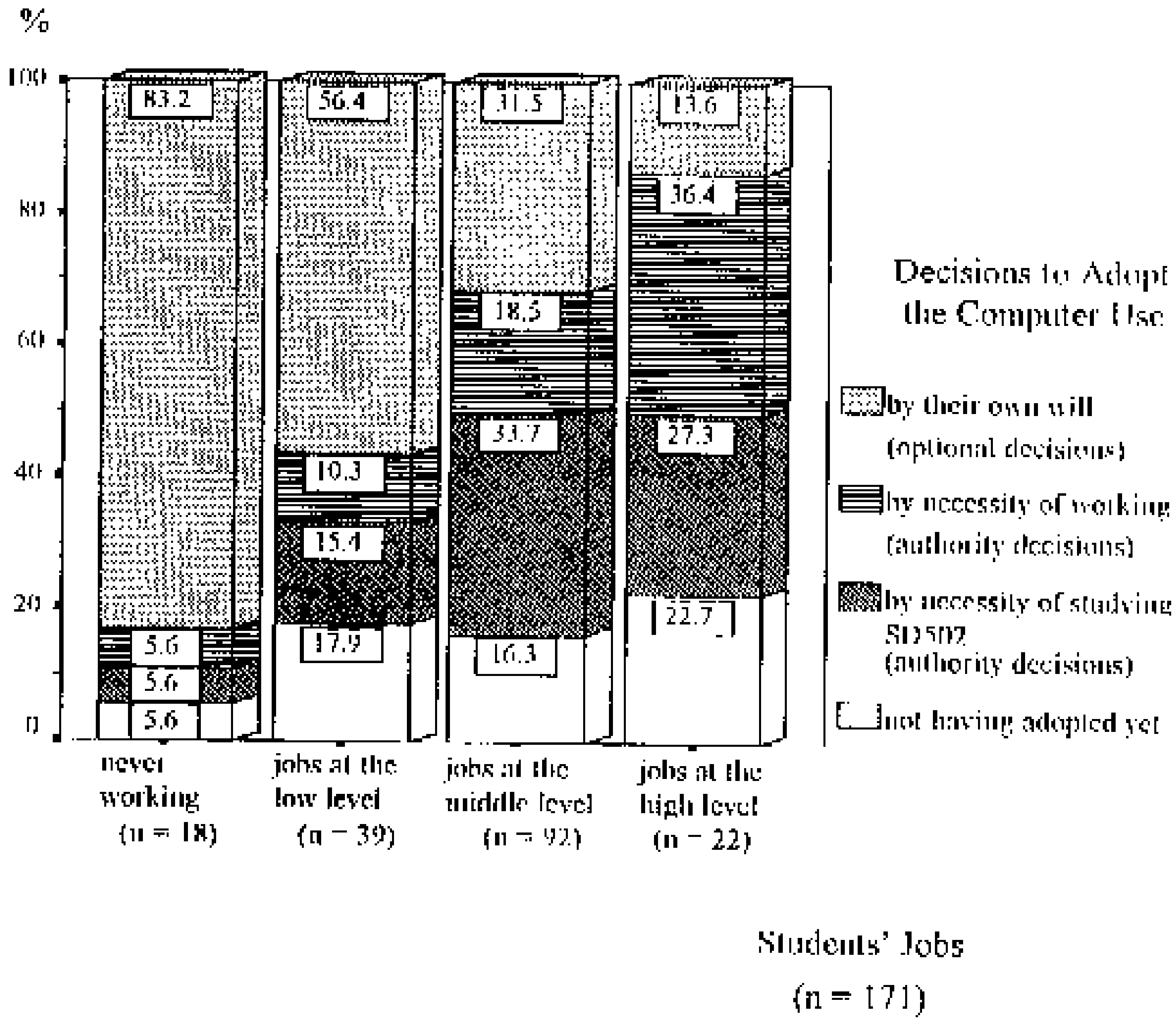


Figure 12 The Classification Results of Discriminant Analysis

As the results of the discriminant analysis did not yeild much understanding about each type of innovation-decisions, the other statistical technique was introduced. The crosstabulation of innovation-decisions by the students' jobs showed something interesting. More insight into the types of innovation-decisions could be gained by the visual representation of the crosstabulation in Figure 13.



χ^2 = 32.19

d.f = 9

p = .0001

(cells with expected frequency <5 : 31.3 %)

Figure 13 Types of Decision to Adopt the Use of Computers by Students' Jobs

While most students (83.2 %) of those who never worked, and were certainly young, adopted the use of computers through the optional decisions, most students (63.7 %)of those who had a job at the high level, and were also quite old, adopted the computer use through the authority decisions. This 63.7 % came from 36.4 % of those who adopted the computer use because they somehow had to use a computer for their tasks and from 27.3 % of those who adopted the use of computers because they had to SD 502.

Given that young(er) students were more likely than old(er) students to become exposed to advanced machines or technologies—in this case, computers—and that young (er) students tended to have a job at the lower position than that of old(er) students, students' jobs appeared to be in inverse relation to types of innoation-decisions. There seemed to be a trend that the lower the students' positions were, the more likely they adopted the use of computers through the optional decisions. On the other hand, the higher the students' positions were, the more likely they adopted the computer use through the authority decisions or had not adopted it yet.

Note that the reasons of students who adopted the use of computers through the authority decision were either that they had to use a computer for their tasks or that they had to study SD. 502. Of those students having a job at the middle level and adopting the use of computers through the authority decision, approximately one-third of them adopted the use of computers because their work became involved in using a computer in some ways, and the rest or two-thirds adopted the use of computers just because they were required to study SD. 502. And of those students having a job at the high level and adopting the use of computers through the authority decision, they were more likely to adopt it owing to work. Slightly over half of them said so. The ratio of students adopting the computer use because of work to students adopting the computer use because of studying SD. 502 seemed to increase with levels of students' jobs.

With the obtained χ^2 of 32.19, the relationship between students' jobs and decisions to adopt the computer use was statistically significant at the .01 level. Note, however, that in the above graphic crosstabulation, authority decisions were classified into two categories to show the reason that made the students adopt the use of computers, leading to several cells with expected frequency less than five. But if the combination of these two categories were instead used as one category representing authority decisions without clarifying their associated underlying reasons, as that used in the discriminant analysis, the obtained χ^2 and df would be 29.18 and 6, respectively, with the observed significance level of .00006 and only 16.7 % of cells with expected frequency less than five. This indicated that the chi-square statistic of the crosstabulation in Figure 14 was applicable as long as it was made clear that there were in fact only three categories of decisions to adopt the use of computers and that for the authority decision category, apart from reporting its conventional percentages, these percentages can be broken up into two parts to express on the basis of reasons behind the decision-making for further understanding.

4. The Use of Computers

Only three kinds of the use of computers were reported: printing, calculation and retrieval. Most students used a computer for their tasks by themselves to a certain extent. Students who used a computer by themselves to a certain extent referred to those who used a computer for their work all by themselves and those who both used a computer by themselves and had others do the computer jobs for them. Some students did not at all use a computer by themselves.

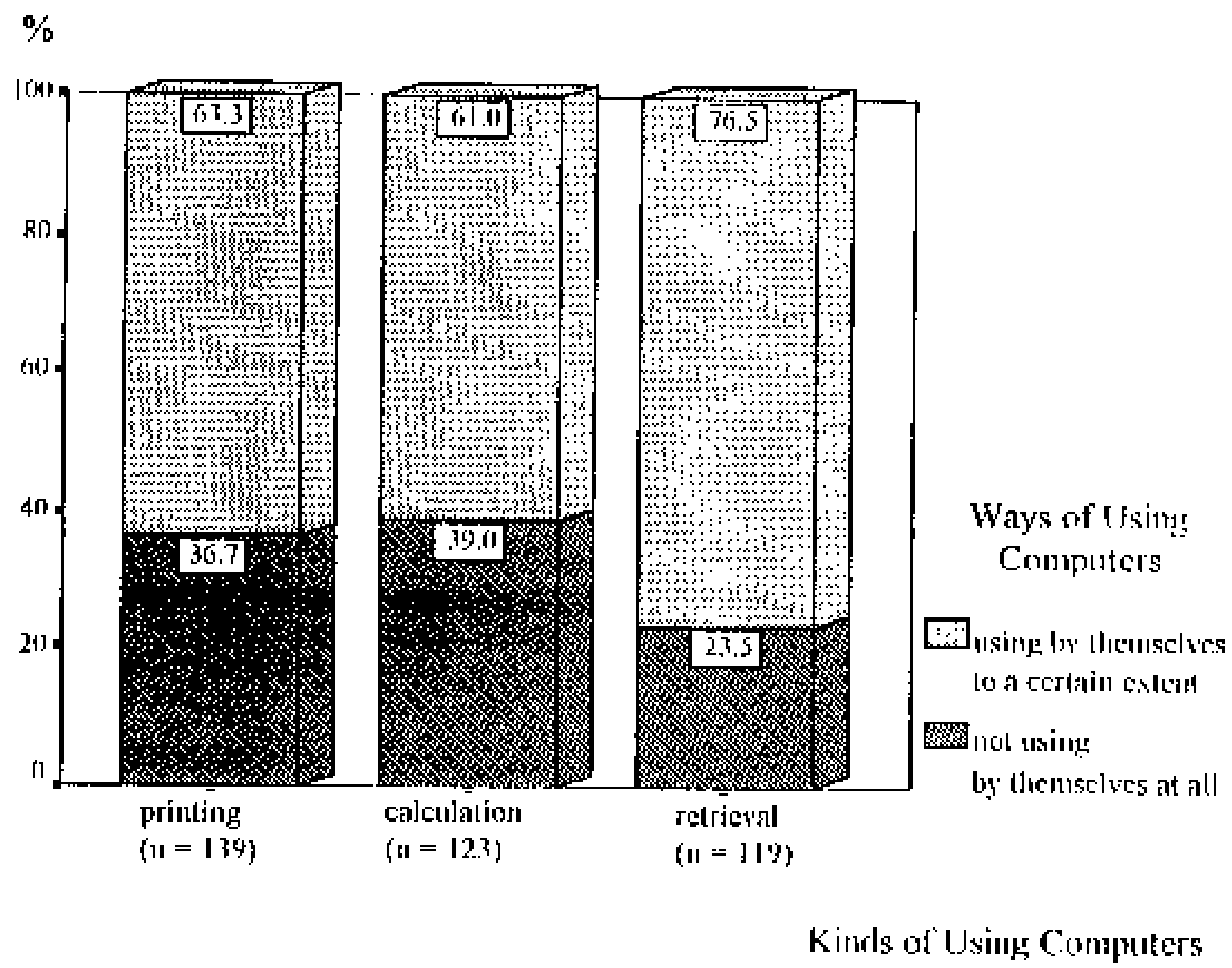


Figure 14 Kinds and Ways of Using Computers

The logistic regression technique was used to analyze the differences between students who used a computer by themselves to a certain extent and those who did not at all use a computer by themselves

Table 11 Means and Standard Deviations of the Independent Variables Used in the Logistic Regression Analysis of Using Computers for Printing [1]

Independent variables	Means	Standard deviation	Minimum	Maximum
Age	33.25	7.23	22	58
Relative advantage	4.44	0.73	1	5
Compatibility	4.14	0.96	1	5
Complexity	3.04	0.79	1	5
Sex (male = 1)	0.45	0.50	0	1
Types of students [2]	0.66	0.47	0	1
Students' jobs [3]				
no jobs	0.10	0.30	0	1
at the low level	0.23	0.42	0	1
at the middle level	0.54	0.50	0	1
at the high level	0.12	0.33	0	1

[1] The tested event was using computers by themselves to a certain extent

[2] Students of the regular program were labelled 1.

[3] Student's jobs was a categorical variable, and it was transformed into a set of deviation contrast with the last category as the reference category.

Table 12 Variables Included in the Logistic Regression Model of Using Computers for Printing

Variables	Step	β	Wald	r	Significance
Complexity	1	-1.1964	14.9407	-.2675	.0001
Types of students	2	1.0918	6.0067	.1488	.0143
Age	3	-0.0688	5.1993	-.1330	.0226
(Constant)		5.8501	15.1240		.0001

A forward stepwise logistic regression analysis was performed to assess prediction of membership in two groups of students who used a computer for printing: the group of students who used a computer by themselves to a certain extent and the group of students who did not at all use a computer by themselves. The predictor variables were age, sex, types of students, jobs, the perceived advantage of a computer, the perceived compatibility of a computer, and the perceived complexity of using a computer.

Of the original 173 cases, 36 cases were excluded from the analysis due to missing data. Three variables were found to be included in the final model. the perceived complexity of using a computer, types of students, and age. Their logistic coefficients were -1.1964, 1.0918, and -0.0688 respectively. The perceived complexity of using a computer had the largest correlation coefficient, -0.2675.

Students who used a computer for printing by themselves to a certain extent tended to be students of the regular program. They were younger, and using a computer did not seem to be difficult to them

60.78 % of those who did not at all use a computer by themselves were correctly predicted, whereas 83.72 % of those who used a computer by themselves to a certain degree were correctly identified. Overall, 75.18 % of all students were correctly classified.

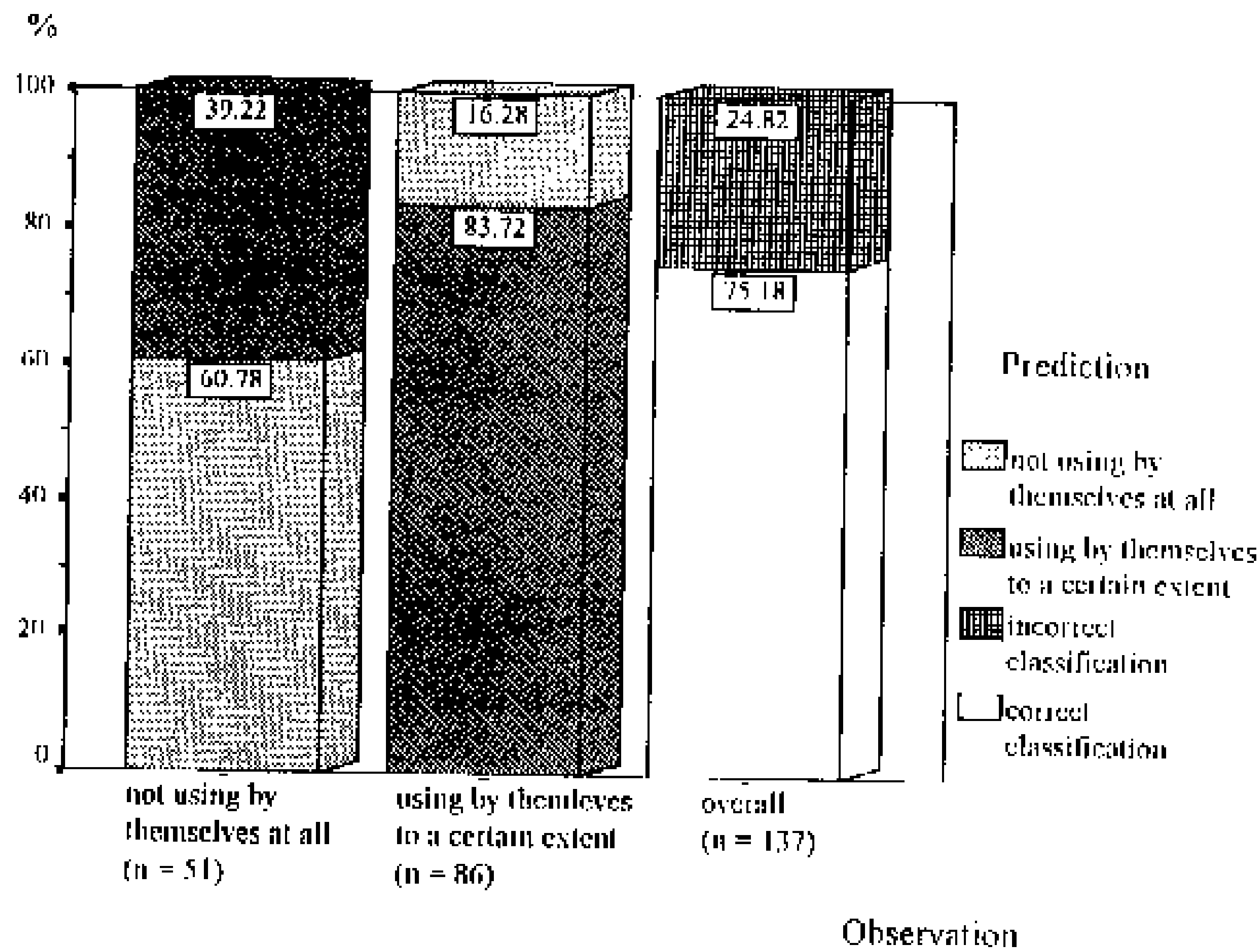


Figure 15 **The Classification Results of the Logistic Regression Analysis of Ways of Using Computers for Printing**

Table 13 Means and Standard Deviations of the Independent Variables Used in the Logistic Regression Analysis of Ways of Using Computers for Calcualtion[1]

Independent variables	Means	Standard deviation	Minimum	Maximum
Age	33.61	7.26	22	58
Relative advantage	4.42	0.71	1	5
Compatibility	4.11	0.97	1	5
Complexity	3.06	0.73	1	5
Sex (male = 1)	0.46	0.50	0	1
Types of students [2]	0.66	0.47	0	1
Students' jobs [3]				
no jobs	0.11	0.32	0	1
at the low level	0.18	0.38	0	1
at the middle level	0.56	0.49	0	1
at the high level	0.14	0.34	0	1

[1] The tested event was using computers by themselves to a certain extent.

[2] Students of the regular program were labelled 1.

[3] Student's jobs was a categorical variable, and it was transformed into a set of deviation contrast with the last category as the reference category.

Table 14 Variables Included in the Logistic Regression Model of Ways of Using Computers for Calculation

Variables	Step	β	Wald	r	Significance
Complexity	1	-1.3822	12.4524	-.2543	.0004
Age	2	-.1185	12.1144	-.2501	.0005
Compatibility	3	0.4522	3.8884	.1081	.0486
(Constant)		6.9851	11.4784		.0007

A forward stepwise logistic regression analysis was used to examine differences between two groups of students who used a computer for calculation: the group of students who used a computer by themselves to a certain extent and the group of students who did not at all use a computer by themselves. The predictor variables were the same as those used to predict membership between the two groups of students who used a computer for printing in the previous analysis, that is, age, sex, types of students, jobs, the perceived advantage of a computer, the perceived compatibility of a computer, and the perceived complexity of using a computer.

52 cases with missing data were rejected, leaving 121 cases to be included in the analysis. Three variables remained in the final model: the perceived complexity of using a computer, age, and the perceived compatibility of a computer. Their logistic coefficients were as follows: -1.3822, -0.1185 and 0.4522. The perceived complexity of using a computer had the highest correlation coefficient, -0.2543.

Students who used a computer for calculation by themselves to a certain degree seemed to be younger and believed that a computer could be applied for their tasks. Most importantly, using a computer were easy for them

The model yielded 71.90 % overall accuracy. While 83.78 % of those who used a computer for calculation by themselves to a certain extent were correctly classified, only 53.19 % of those who did not at all use a computer by themselves were correctly predicted.

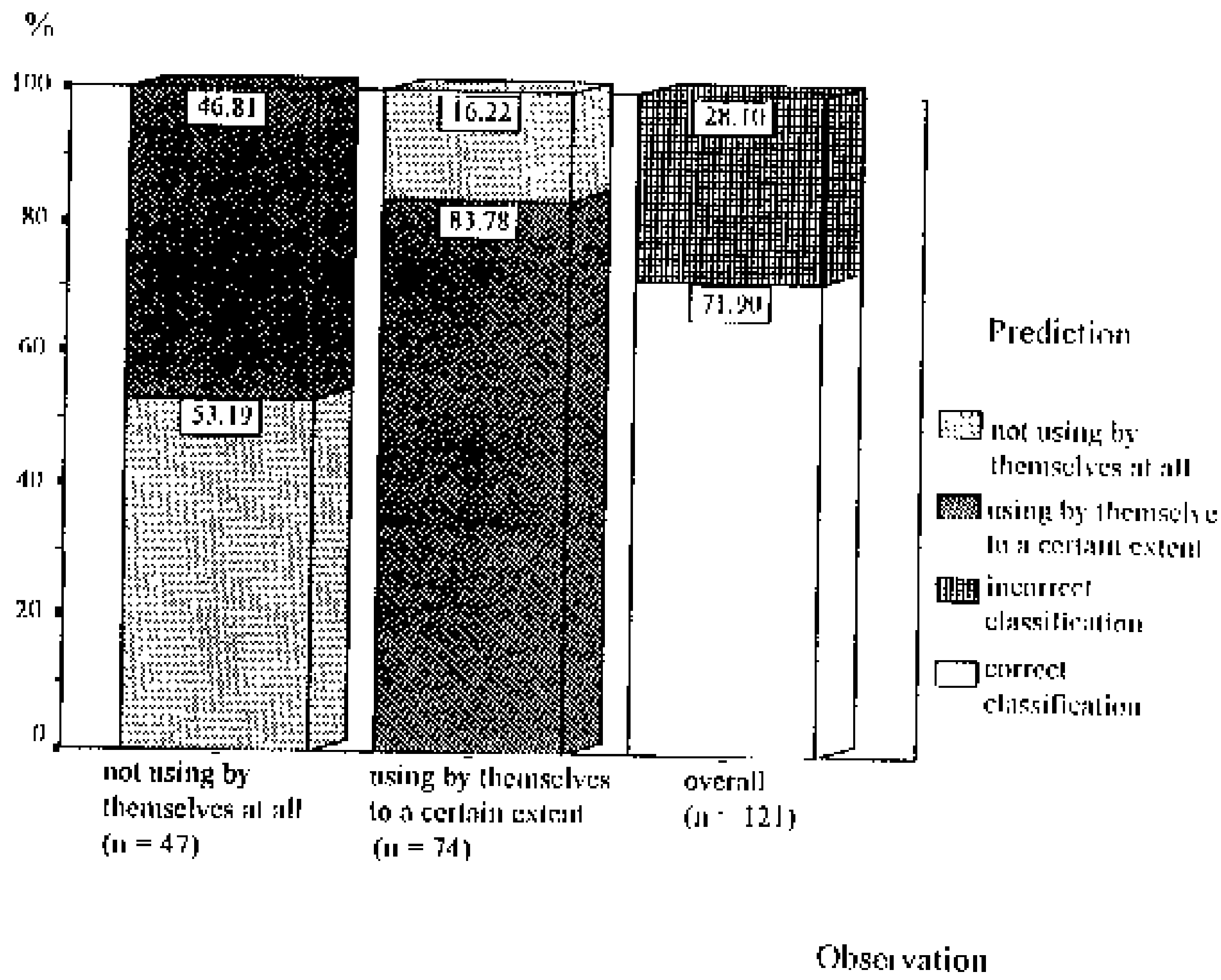


Figure 16 The Classification Results of the Logistic Regression Analysis for Ways of Using a Computer for Calculation

Table 15 Means and Standard Deviations of the Independent Variables Used in the Logistic Regression Analysis of Ways of Using Computers for Retrieval [1]

Independent variables	Means	Standard deviation	Minimum	Maximum
Age	32.94	6.86	22	58
Relative advantage	4.46	0.68	1	5
Compatibility	4.14	0.96	1	5
Complexity	3.00	0.75	1	5
Sex (male = 1)	0.48	0.50	0	1
Types of students [2]	0.66	0.47	0	1
Students' jobs [3]				
no jobs	0.11	0.31	0	1
at the low level	0.22	0.41	0	1
at the middle level	0.55	0.49	0	1
at the high level	0.12	0.32	0	1

[1] The tested event was using computers by themselves to a certain extent.

[2] Students of the regular program were labelled 1.

[3] Student's jobs was a categorical variable, and it was transformed into a set of deviation contrast with the last category as the reference category.

Table 16 Variables Included in the Logistic Regression Model of Ways of Using Computers for Retrieval

Variables	Step	β	Wald	r	Significance
Relative advantage	1	.5850	2.6654	.0717	.1026
Complexity	2	-.9831	7.4007	-.2044	.0065
Types of students	3	1.1922	5.5875	.1666	.0181
(Constant)		.9183	.2336		.6288

A forward stepwise logistic regression analysis was used to distinguish between two groups of students who used a computer for retrieval: the group of students who used a computer by themselves to a certain extent and the group of students who did not at all use a computer by themselves. Like two previous analyses, the predictor variables were age, sex, types of students, jobs, the perceived advantage of a computer, the perceived compatibility of a computer, and the perceived complexity of using a computer.

Only 118 cases with valid data of the original 173 cases were selected for the analysis. The final model contained three variables, the perceived advantage of a computer, the perceived complexity of using a computer, and types of students. Their logistic coefficients were 0.5850, -0.9831 and 1.1922, respectively. Again, the perceived complexity of using a computer had the largest correlation coefficient, -0.2044.

Students who used a computer for retrieval by themselves to a certain extent appeared to be students of the regular program. They believed that a computer was useful and that using a computer was not difficult.

In contrast with only 50.0 % accuracy in prediction of students who did not at all use a computer by themselves, 95.56 % accuracy was achieved in identification of those who used a computer for retrieval by themselves to a certain extent. The overall predictive accuracy was 84.74 %.

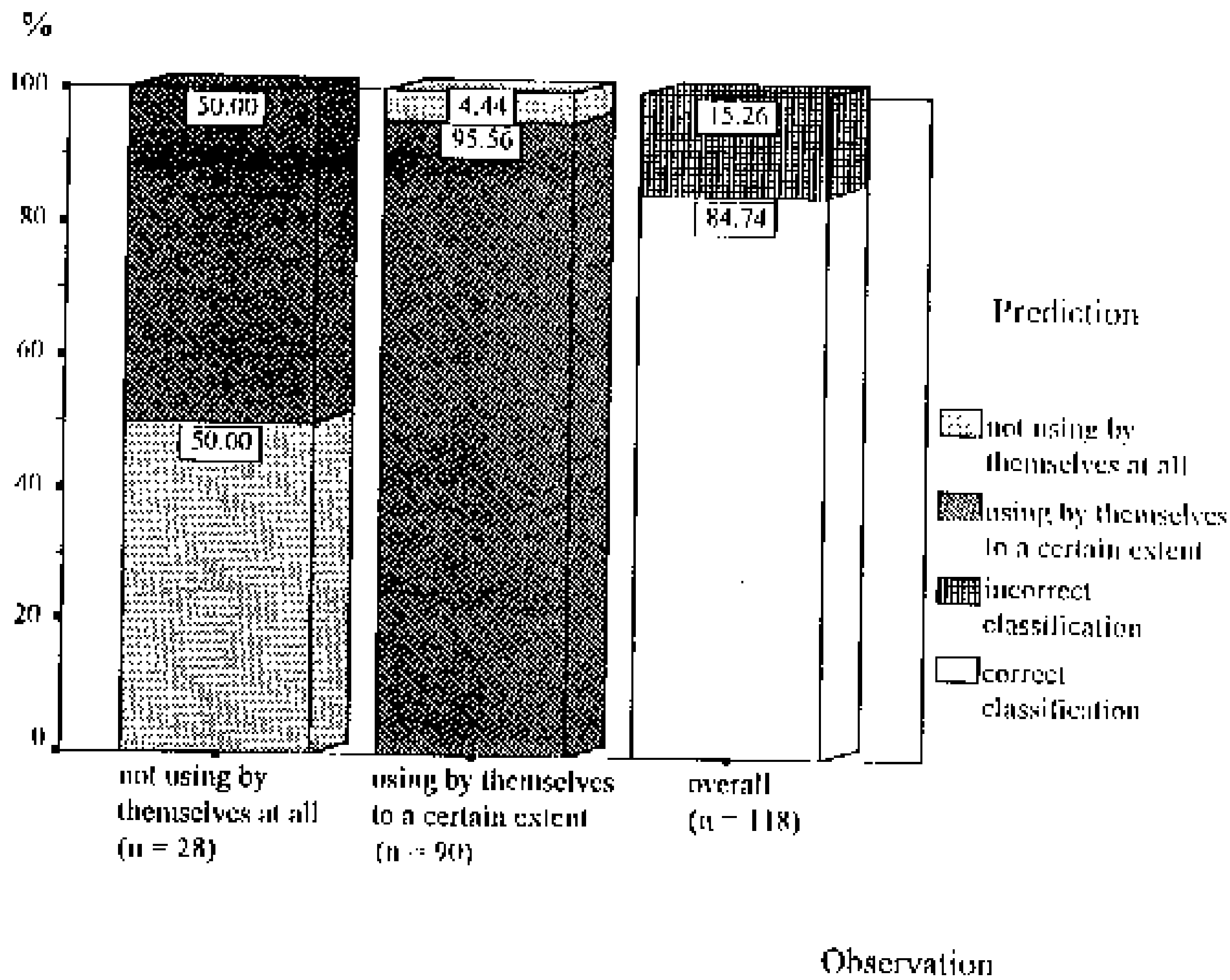


Figure 17 The Classification Results of the Logistic Regression Analysis of Ways of Using a Computer for Retrieval

After having examined the differences between students who used a computer by themselves to a certain extent and students who did not at all use a computer by themselves, the technique of graphic crosstabulation was used to find out who used a computer for them when they did not use it by themselves.

Among the revelations were that both two students who never worked said that they always hired typists to print their papers. Six out of ten or 60.0 % of the answers from students whose jobs were at the low level also used the service of typists. 18 out of 34 or 52.9 % of the answers from students with jobs at the middle level reported that they had personnel in charge type their papers, and seven out of nine or 77.8 % of students with jobs at the high level reported the same thing. Only a few students had their friends do the printing job for them.

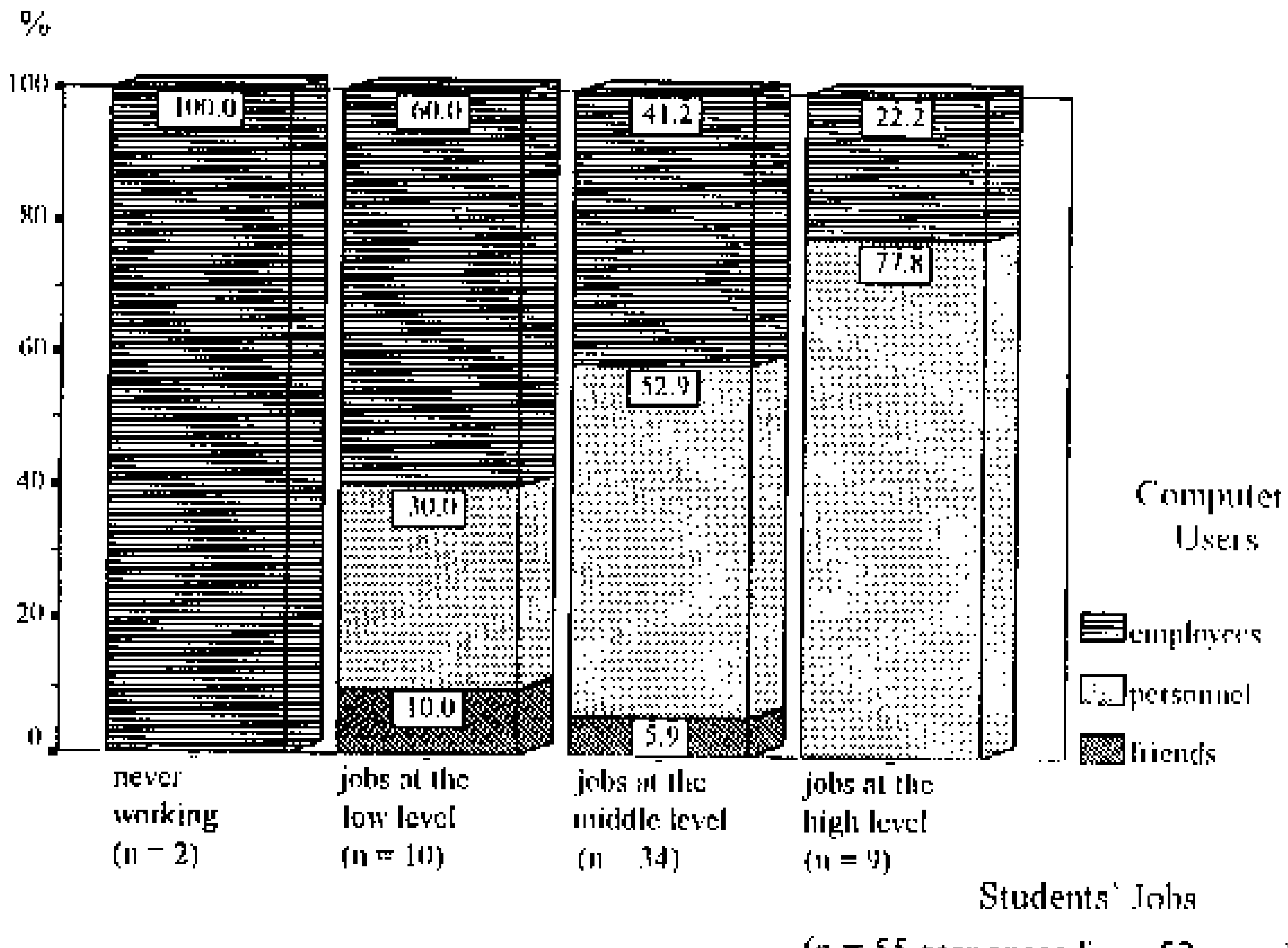


Figure 18 Computer Users for Students who Did Not at all Use Computers by Themselves for Printing

Among students who used computers by themselves to a certain extent for printing, most answers from students who never worked and from those who had jobs at the low level showed that these students received help for a printing job from their friends, while most answers from students with jobs at the middle level and from those with jobs at the high level indicated that the service came from personnel in charge. A few answers indicated that besides using a computer by themselves, they had their papers printed by employees.

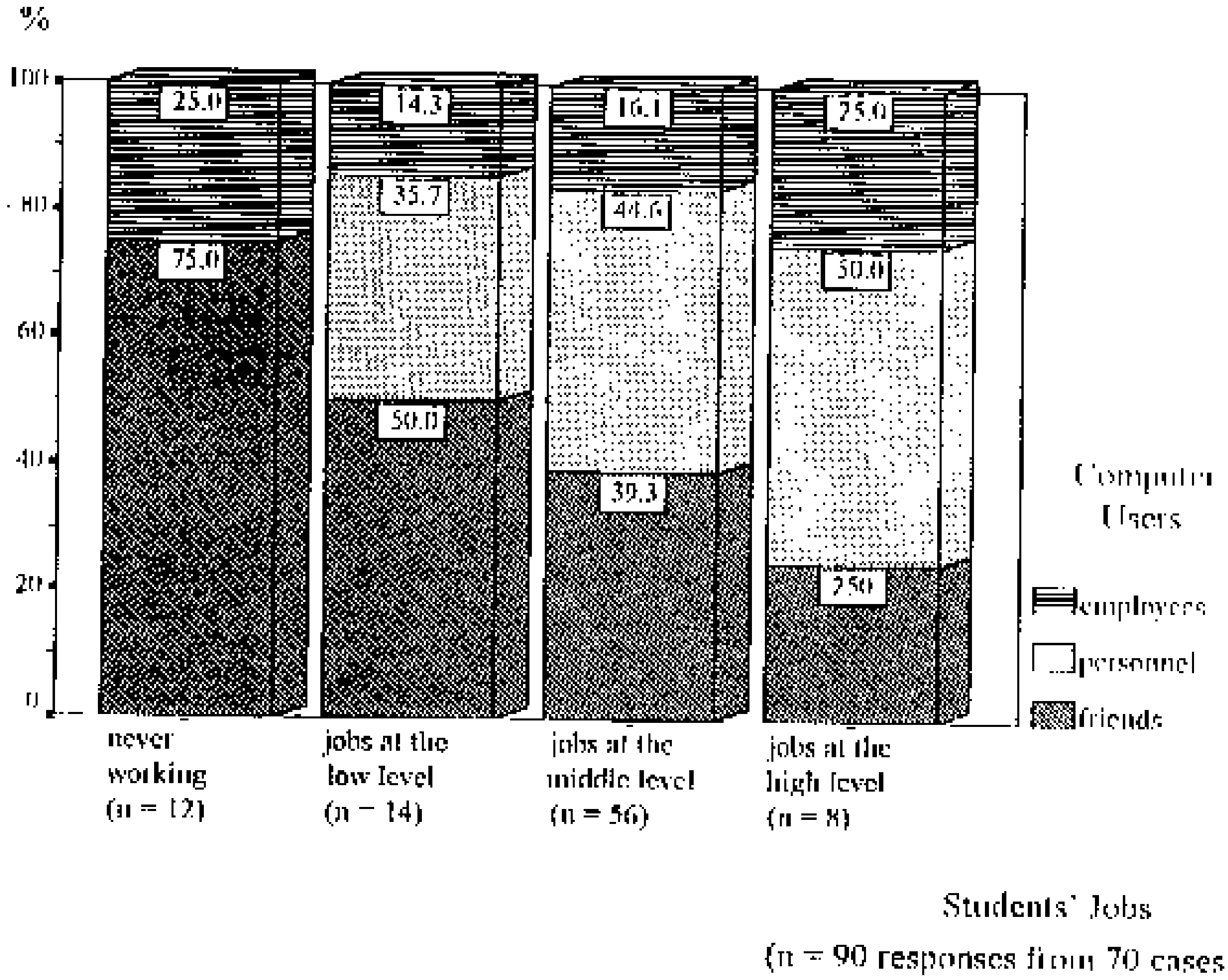


Figure 19 **Computer Users for Students who Used Computers by Themselves to a Certain Extent for Printing**

Two students who never worked had their friends do all the calculation jobs by computers. Four out of six responses from students with jobs at the low level and 16 out of 36 or 44.4 % of those from students with jobs at the middle level also did the same thing. Eight out of ten answers from students with jobs at the high level reported that personnel in charge used computers to do calculation for them. There was a small number of answers referring to hiring people to the calcualtion jobs

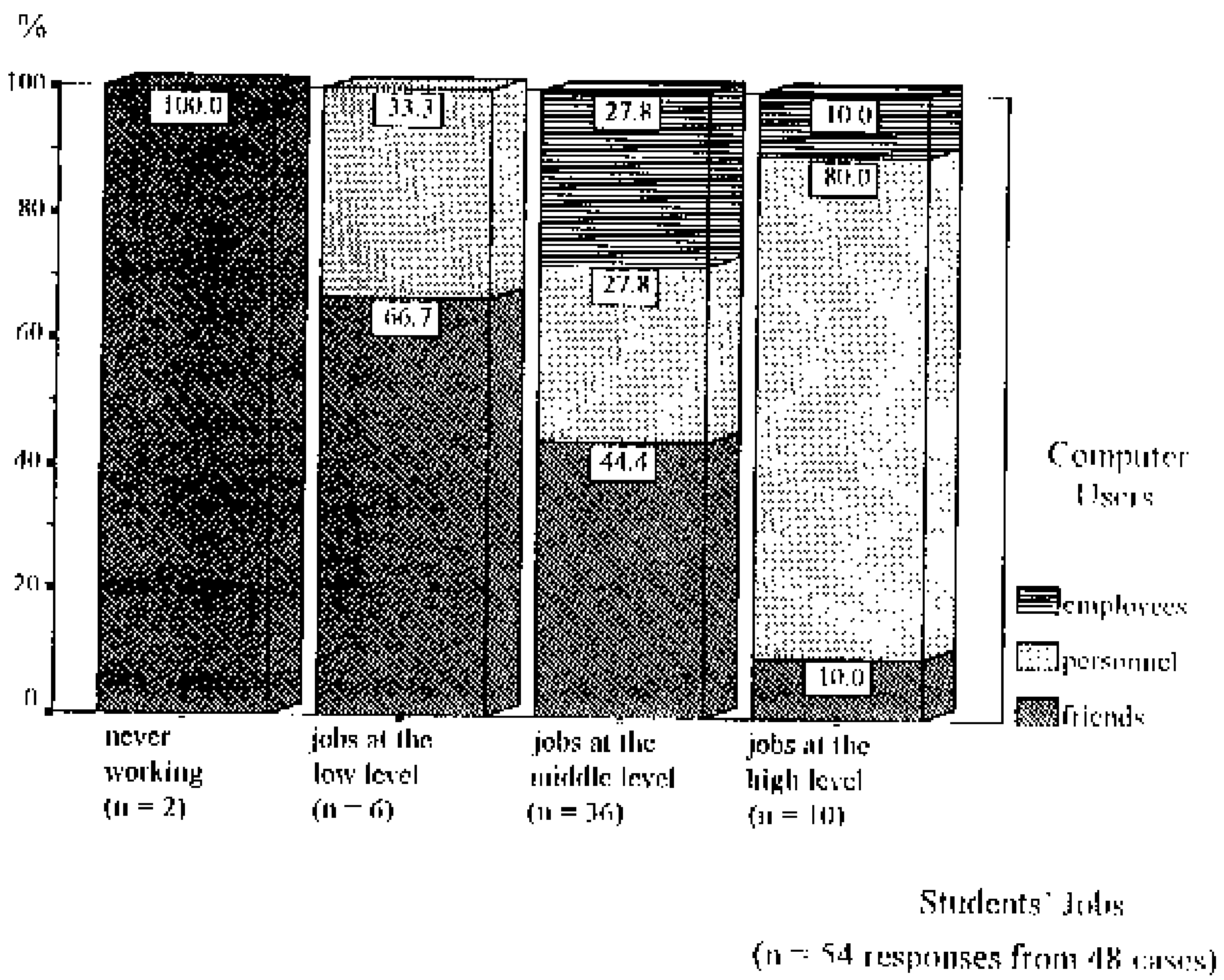


Figure 20 **Computer Users for Students who Did Not at all Use Computers by Themselves for Calculation**

All students who never worked and who had jobs at the low level received some help to perform calculation by computer from their friends. 14 out of 25 responses from students with jobs at the middle level also reported similarly. There were four answers from students with jobs at the high level: two indicated help from friends and the other two reported assistance from personnel in charge. Again, only a few answers indicating hiring people to do the calculation jobs by computer were found.

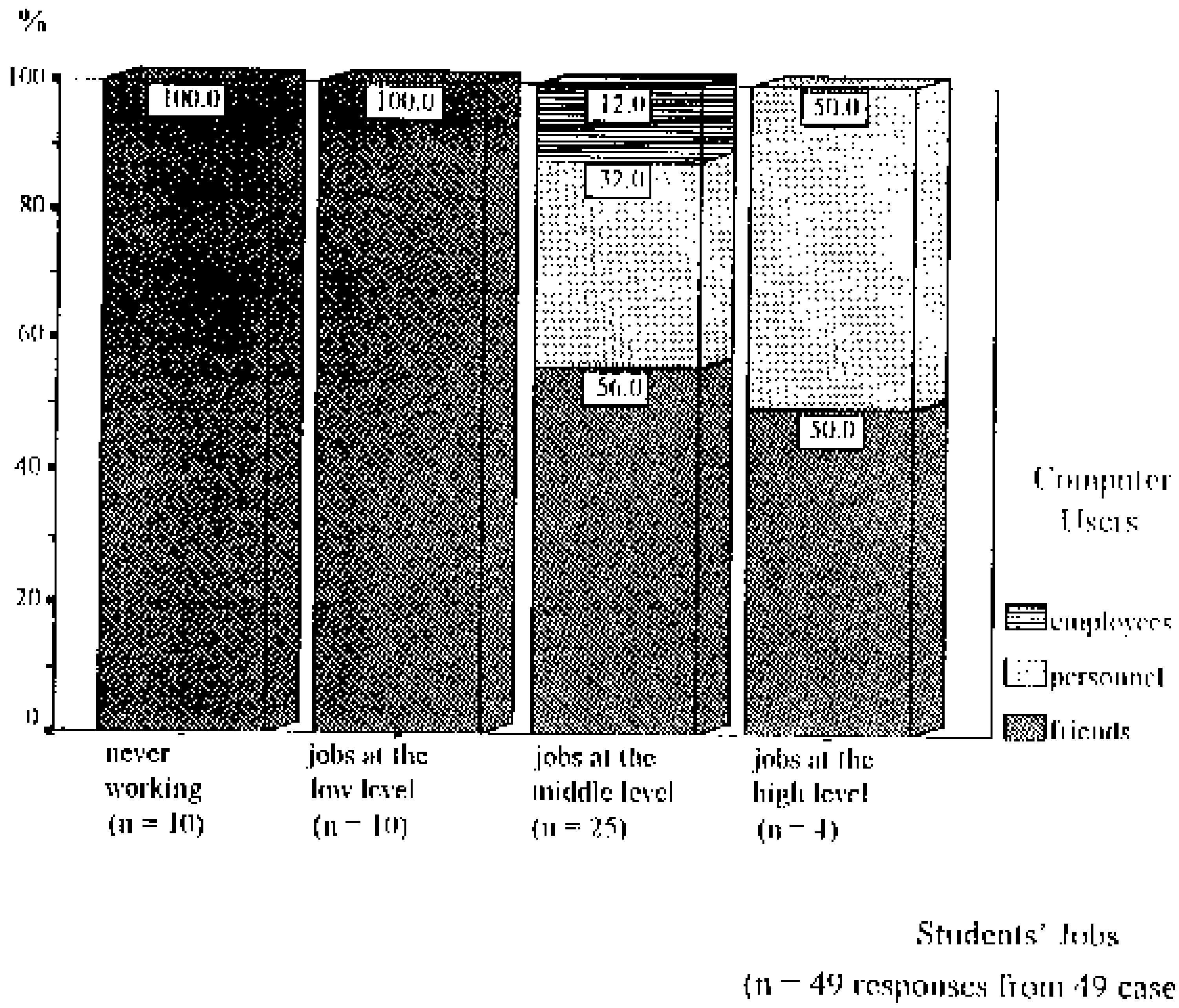


Figure 21 Computer Users for Students who Used Computers by Themselves to a Certain Extent for Calculation

A small number of students did not at all use computers by themselves for retrieval. In this case, there was only one answer from one students who never worked, reporting that he or she had the librarians help search information by computer. Four out of seven answers (57.1 %) from students with jobs at the low level stated that the people who used computers to gather information for them were friends, two answers indicating librarians and another answers indicating personnel in charge of doing these tasks. Most answers from students with jobs at the middle level (17 out of 27 or 63.0 %) and from those with jobs at the high level (four out of six or 66.6 %) indicated receiving the service from librarians.

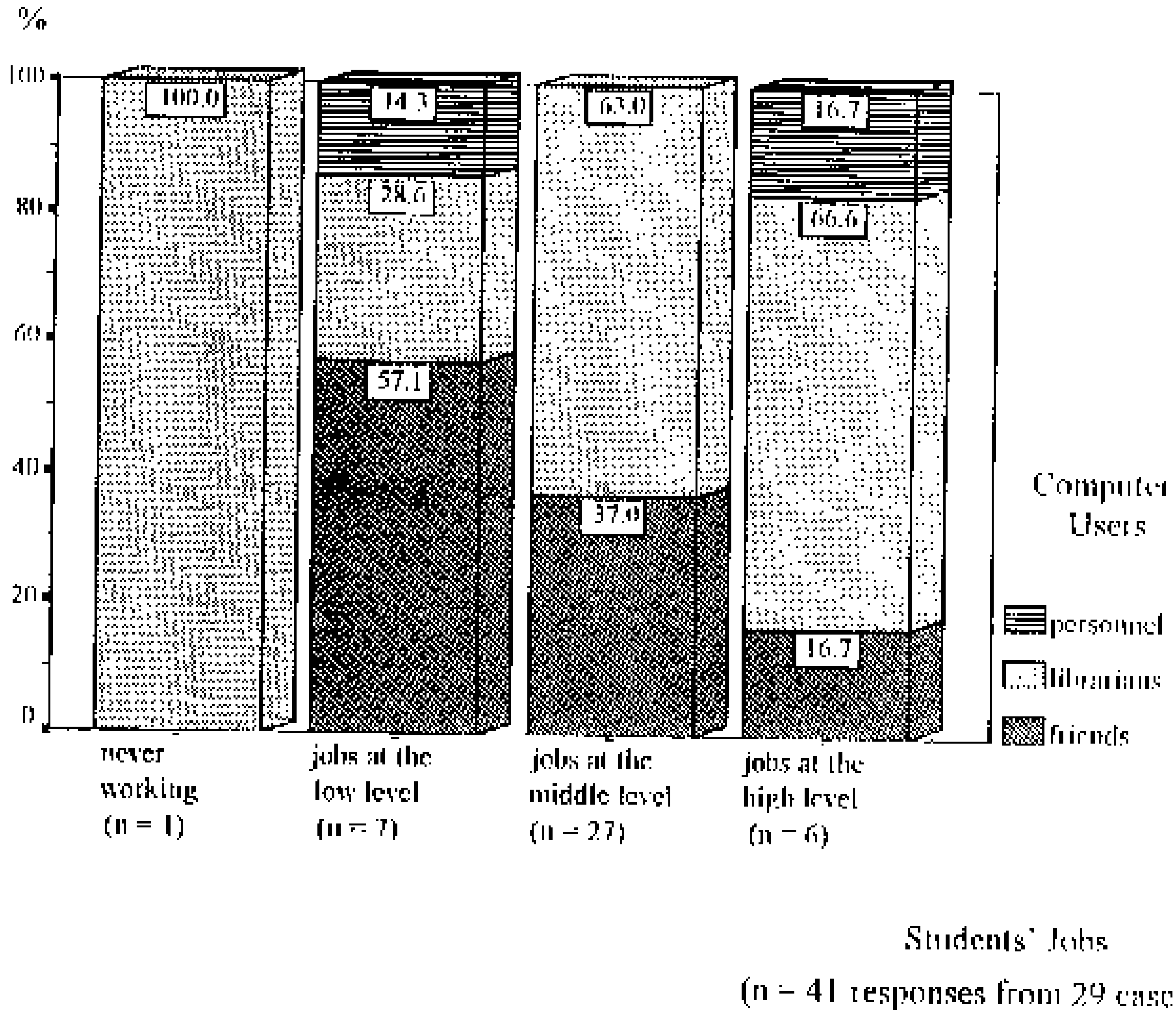


Figure 22 Computer Users for Students who Did Not at all Use Computers by Themselves for Retrieval

Four students who never worked and used computers by themselves to a certain degree had their friends help them retrieve information from computers. Six out of twelve answers from students with jobs at the low level and 17 out of 33 responses from students with jobs at the middle level said their friends helped them; the rest of the answers of these two groups stated they received assistance from librarians. Of four answers gathered from students with jobs at the high level, one indicated help from friends and the other three indicated help from librarians.

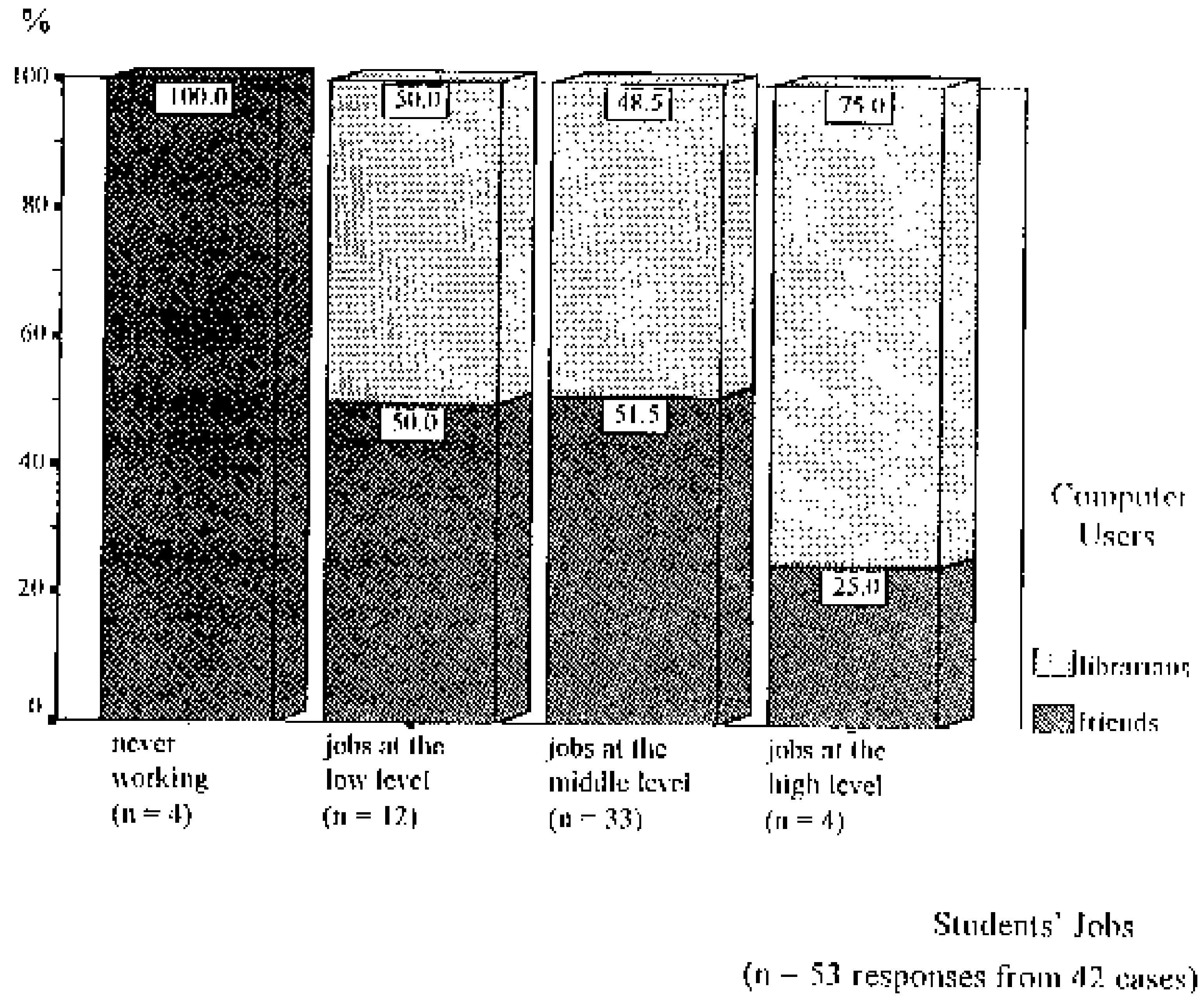


Figure 23 **Computer Users for Students who Used Computers by Themselves to a Certain Extent for Retrieval**

In the earlier logistic regression analyses, ways of using computers were classified into two main categories: 1) using computers by themselves to a certain extent and 2) not using computers by themselves at all. In the next three analyses, however, they were divided into three types to further contrast students' differences; they were as follows: 1) completely using computers by themselves; 2) not using computers by themselves at all; and 3) partly using computers by themselves.

Table 17 Reasons for Ways of Using a Computer for Printing

Reasons	Ways of Using a Computer for Printing		
	Completely using it by themselves	Not using it by themselves at all	Partly using it by themselves
Convenience	40.0 (14)	20.5 (18)	38.4 (70)
Better output generated	37.1 (13)	-	11.0 (20)
Saving costs	22.9 (8)	1.1 (1)	3.3 (6)
Not being capable of using it	-	20.5 (18)	1.7 (3)
Having no computers to use	-	3.4 (3)	1.7 (3)
Need for help with advanced techniques	-	-	20.3 (37)
Having personnel in charge of doing this task	-	28.4 (25)	14.3 (26)
Not being good at typing	-	26.1 (23)	9.3 (17)
Total responses [1]	100.0 (35)	100.0 (88)	100.0 (182)

[1] A total of 305 responses from 139 cases.

Regarding using computers for printing, "convenience" was the reason that led the survey for students who completely used computers by themselves (40.0 %) and for those who partly used computers by themselves (38.4 %). For those who did not at all use computers by themselves, the reason that they had personnel in charge of doing this task was on top (28.4 %), followed close by the reasons that they were not good at typing (26.1 %), that they did not know how to do it—specifically, how to use a word processor

—(20.5 %), and that having people type their papers was convenient (20.5 %). The second most common responses (40.0 %) for students who completely used computers by themselves was that they could do it better if they used computers to do a printing job by themselves. The reason having the second highest percentages (20.3 %) of students who partly used computers by themselves was that they could not do a certain thing or technique and had to have others do it for them. The next highest percentages of responses (14.3 %) of this group of students was that they had subordinates to do the job for them. Quite a few percentages (22.9 %) of the answers of the reason for saving costs were found in the group of students who completely used computers by themselves, compared to a very small percentages of those found in the groups of students who did not at all used computers by themselves (1.1 %) and of students who partly used computers by themselves (3.3 %).

Table 18 Reasons for Ways of Using a Computer for Calculation

Reasons	Ways of Using a Computer for Calculation		
	Completely using it by themselves	Not using it by themselves at all	Partly using it by themselves
Convenience	53.1 (17)	11.0 (8)	39.4 (43)
Better output generated	40.6 (13)	-	7.3 (8)
Saving costs	6.3 (2)	-	-
Not being capable of using it	-	56.2 (41)	5.5 (6)
Having no computers to use	-	-	0.9 (1)
Need for help with advanced techniques	-	-	33.9 (37)
Having personnel in charge of doing this task	-	20.5 (15)	7.3 (8)
Not being good at typing	-	12.3 (9)	1.8 (2)
Total responses[1]	100.0 (32)	100.0 (73)	100.0 (109)

[1] A total of 214 responses from 121 cases.

For students who completely used computers by themselves for statistical calculation, the reason for convenience was most common (53.1 %), followed close behind by the reason that they could do it better than that done by other people (40.6 %). The reason for thriftiness accounted for only 6.3 %. For students who did not at all used computers by themselves, most responses (56.2 %) stated that they did not know how to use computers for statistical calculation or were not good at it. The second highest answers (20.5 %) represented the reason that they had personnel in charge of doing this task. And for students who partly used computers by themselves, 39.4 % of the responses stated the reason for convenience and 33.9 % indicated the reason for not being able to do a certain procedure and having to have other people do it for them.

Table 19 Reasons for Ways of Using a Computer for Retrieval

Reasons	Ways of Using a Computer for Retrieval		
	Completely using it by themselves	Not using it by themselves at all	Partly using it by themselves
Convenience	70.0 (42)	3.7 (1)	47.1 (40)
Better output generated	30.0 (18)	-	2.3 (2)
Not being capable of using it	-	96.3 (25)	-
Need for help with advanced techniques	-	-	50.6 (43)
Total responses[1]	100.0 (60)	100.0 (26)	100.0 (85)

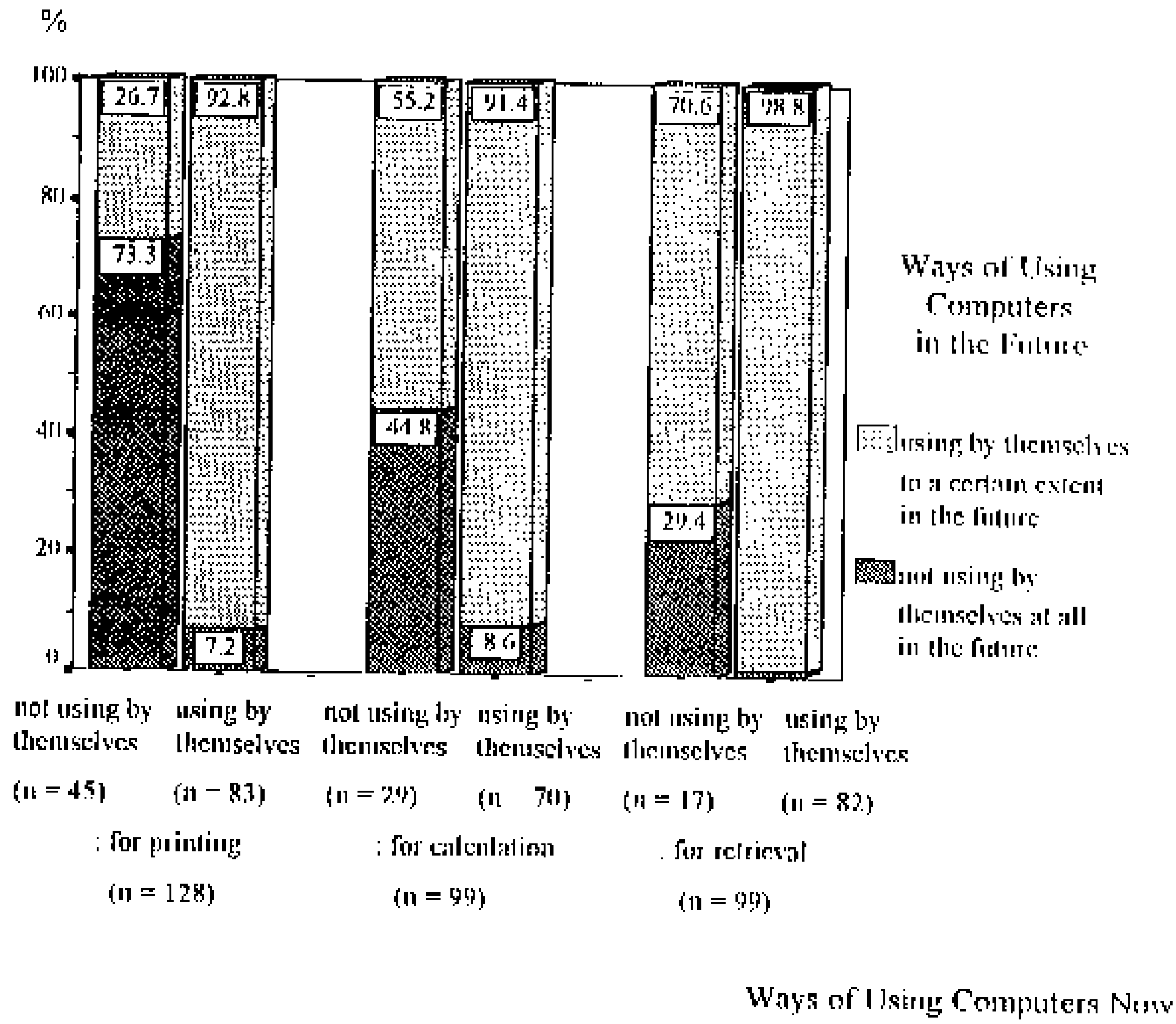
[1] A total of 173 responses from 117 cases.

For students who completely used computers by themselves to retrieve information, most of their answers (70.0 %) reported the reason for convenience. The other 30.0 % of the answers showed the reason that it was better for themselves to retrieve information on their own. Almost all responses (96.3 %) of students who did not at all use computers by themselves for retrieval indicated the reason for not being capable of doing it. Of students who partly used computers by themselves for searching for information, 47.1 % of the responses specified the reason for convenience and 50.6 % stated the reason for needing other people to do it for them.

A graphic crosstabulation procedure was used to investigate whether students' ways of using a computer now would remain the same in the future. It was found that there was a statistically significant change in ways of using a computer at present and in the future. All three graphic crosstabulation exhibited the same pattern, quite a few students who now did not at all use a computer by themselves would try to use it to a certain extent in the future, and almost all students who now used a computer by themselves to a certain degree would still use it in the same fashion.

Of students who now did not use a computer by themselves for printing, 26.7 % reported that they would use it by themselves to a certain extent in the future. Of students who now did not use a computer by themselves for calculation, 55.2 % said they would try to use it by themselves to a certain degree in the future. And of students who now did not use a computer by themselves for retrieval, 70.6 % answered that they would use it by themselves to some extent in the future.

Only a small number of students who now used a computer by themselves to a certain degree reported that they would give up using a computer by themselves and have other people do all the computer jobs for them; 7.2 % of students now using a computer by themselves for printing, 8.6 % of those now using a computer by themselves for calculation, and 1.2 % of those now using a computer by themselves for retrieval said so.



χ^2 = 60.18
d.f = 1
p = .0000

χ^2 = 17.38
d.f = 1
p = .0000

χ^2 = 19.65
d.f = 1
p = .0000
(cells with expected frequency < 5 : 50.0 %)

Figure 24 Ways of Using Computers Now by Those in the Future

Most students who had already adopted the computer use had studied SD 502 when this thesis was conducted, so it was not unusual to find out that the highest percentages of responses of each group of students indicated that they studied at NIDA (figure 25). For students who never worked, the second highest percentages of responses (25.5 %) indicated that they received computer knowledge from a computer school, followed by 19.1 % indicating that they studied computers by themselves. For students who had jobs at the low level, the second most common responses (20.9 %) showed that they studied computers by themselves, followed by 17.9 % indicating that they studied at a computer school and another 17.9 % stating that they studied computers from their friends. For students who had jobs at the middle level, the second highest answers (18.6 %) stated that their friends taught them how to use a computer, followed by 17.8 % showing that they studied on their own. And for students who had jobs at the high level, the second most common answers (34.4 %) indicated that they studied computers by themselves, followed by 12.5 % stating that they studied from their friends and another 12.5 % indicating that they received computer knowledge from computer personnel at their workplace.

Percentages for responses indicating acquiring computer knowledge from a computer achool were small (9.3 %) for students who had jobs at the middle level and even no percentages at all for students who had jobs at the high level. Percentages for responses indicating studying computers at their workplace increased with levels of jobs, 3.0 % for students who had jobs at the low level, 7.0 % for students who had jobs at the low level, and 12.5 % for students who had jobs at the high level. Percentages for answers indicating that they received computer knowledge when they were undergraduates of students who never worked (12.8 %) outnumbered those of any other type of students, 8.9 % of students with jobs at the low level, 4.6 % of students with jobs at the middle, and 3.1 % of students with jobs at the high level.

If the answers indicating studying computers at NIDA were ignored, it appeared that most students received computer knowledge by studying on their own and studying from their friends. As job levels increased, there were less and less percentages of answers indicating receiving computer knowledge while being undergraduates and of answers indicating acquiring computer literacy from a computer school but more and more percentages of reponses indicating receiving computer knowledge at their workplace Only a few students were taught how to use a computer by their family members.

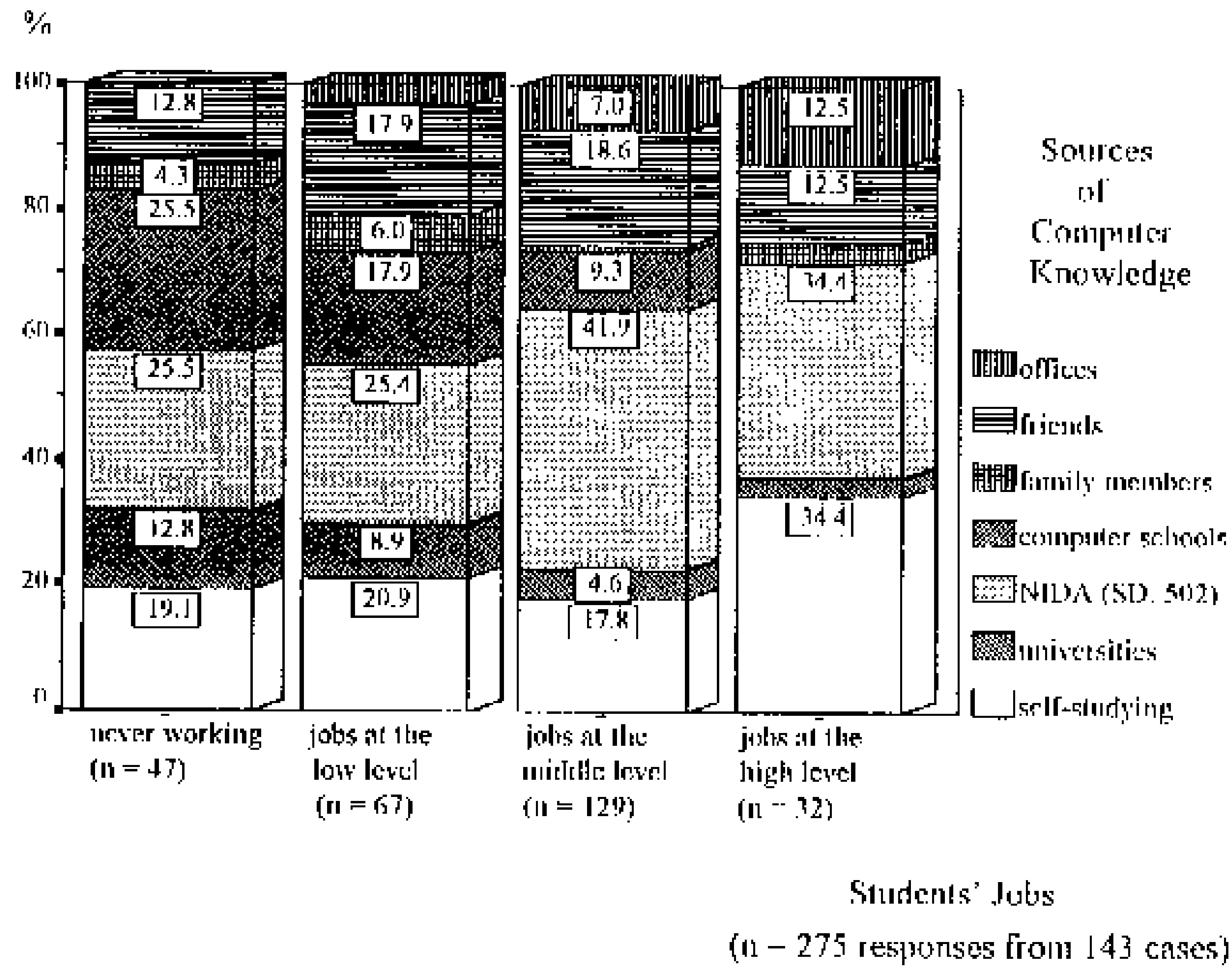


Figure 25 Sources of Computer Knowledge by Students' Jobs

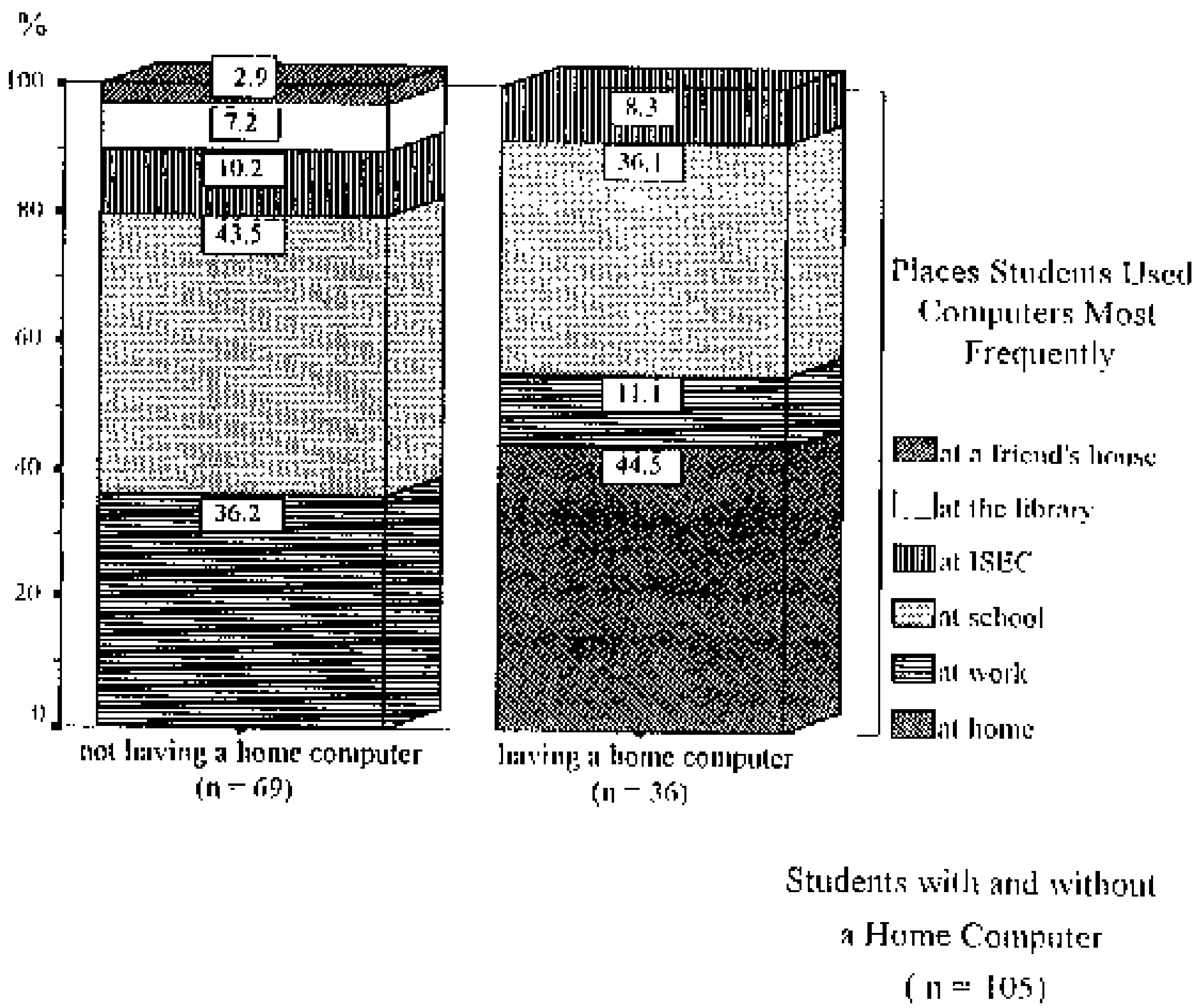


Figure 26 The Places Students Used Computers Most Frequently by Possession of a Home Computer

In order to find out where students of the School used computers most often and whether the place had an association with possession of a home computer, a graphic crosstabulation was performed. In this analysis, the fresh recruits – that is, students of the fourth class four of the special program and students of the eighteenth class of the regular program –were excluded. It was found that most students who did not have a home computer (43.5 %) used a computer at the School. Among students who had a home computer, most students (44.5 %) used a computer at home, slightly higher than the next highest of 36.1 % who reported that they used a computer at the School most frequently. The second most popular place for using a computer for students who did not have a home computer was their workplace (10.2 %). Such places as the ISEC rooms, the library and friends' house were used most often by a small number of students. This pointed out that the School's computer lab was a very popular place to use a computer.

These students were asked whether they experienced any trouble with the number of computers in the School's lab, and it was discovered that the great majority of students (87.0 %) expressed that there were too few computers while the rest (13.0 %) said they were not affected by the School's number of computers.

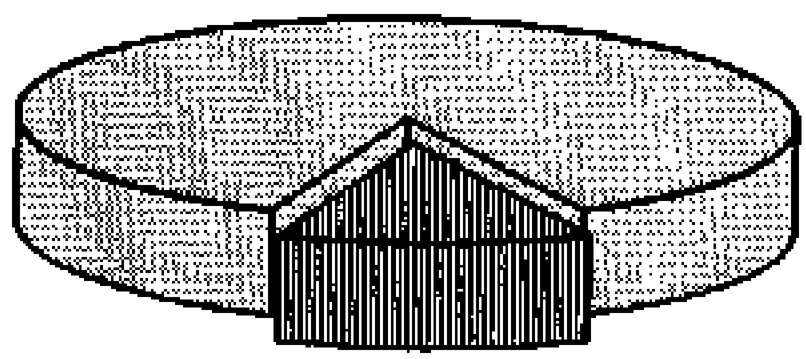


Figure 27 Opinions about the Number of the School's Computers

The next analysis was performed to examine differences between first-semester students and second-or-other-semester students regarding problems about using computers. Note that the previous analysis indicated that most students, excluding recently-recruited students, used a computer at the School most frequently, and that first-semester students were very unlikely to use a computer at the School very often. It was found that most students of both two groups had difficulty with solving computer bugs and expressed that they did not have enough knowledge to use a computer to produce what they really wanted to. Other minor problems of the fresh recruits were such as the lack of provision of computers to use and the lack of support in advice about using a computer, whereas other problems that second-or-other-semester students experienced involved such using computers as the lack of knowledge in studying computer outputs and difficulty with English. Both groups had nearly equal percentages of answers indicating having difficulty with gaining access of computers, but there were higher percentages of responses of second-or-other-semester students than those of first-semester students that stated facing bureaucratic rules of gaining the access to use a computer. Nevertheless, compared to other problems, the problem about regulations governing gaining the computer access received very small percentages in both two groups. Of the fresh recruits, there were 7.1 % and 2.6 % of answers indicating the problems of poor condition of computers and peripherals, respectively. In contrast, the same problems receiving 4.7 % and 6.1 %, respectively, for second-or-other-semester students

Table 20 Problems about the Use of Computers

Problems of using a computer	Students	
	first-semester students	second-or-other-semester students
The access of computers when in need of using	8.5 (13)	8.7 (60)
Bureaucratic rules of gaining the computer access	3.3 (5)	5.2 (36)
Not being able of solving computer bugs	13.0 (20)	10.3 (71)
Lack of knowledge in using for the desired output	9.7 (15)	8.7 (60)
Lack of knowledge in interpreting computer outputs	7.1 (11)	8.0 (55)
Lack of knowledge in using a printer	4.6 (7)	6.3 (43)
Not good at typing	6.5 (10)	8.0 (55)
The interaction in English	9.1 (14)	7.9 (54)
Confusing on-screen (computer) help	7.1 (11)	8.4 (58)
Computers in poor condition	7.1 (11)	4.7 (32)
Peripherals in poor condition	2.6 (4)	6.1 (42)
Lack of computer provision	9.0 (14)	6.3 (43)
Lack of support in computer advice	9.0 (14)	6.3 (43)
Fear of breaking down a computer	3.2 (5)	5.1 (35)
Total responses [1]	100.0 (154)	100.0 (687)

[1] A total of 841 responses from 114 cases.

Regarding suggestions about using computers, it was discovered that second-or-other-semester students gave most votes to the suggestion about teaching other essential computer programs, followed by the suggestions about providing computer personnel, computer books and modern computers in the computer lab. A high percentages of answers of first-semester students suggested equipping the computer lab with computer books and printer manuals. There were more percentages of responses of first-semester students than those of second-or-other-semester students concerning supporting students to use computers for printing and statistical calculation and analyzing computer output on their own.

Table 21 Suggestions about the Use of Computers

Suggestion for the use of computers	Students	
	first-semester students	second-or-other-semester students
Reduction of inconvenience in gaining the access	7.5 (52)	7.1 (22)
Provision of computer books in the computer lab	10.2 (71)	10.9 (34)
Provision of printer manuals in the computer lab	10.5 (74)	9.9 (31)
Provision of computer personnel in the computer lab	9.3 (65)	12.8 (40)
Keeping good maintenance of computers	9.1 (63)	8.3 (26)
Provision of modern computers	9.8 (7)	10.3 (32)
Teaching other essential programs	8.9 (62)	13.1 (41)
Supporting students to use a computer for printing their reports on their own	5.7 (40)	4.5 (14)
Supporting students to use a computer for statistical calculation on their own	9.1 (63)	7.1 (22)
Supporting students to perform statistical analysis on their own	10.4 (72)	6.1 (19)
Total responses [1]	100.0 (695)	100.0 (312)

[1] A total of 1007 responses from 161 cases.

In order to draw a distinction between students who held the opinion that SD. 502 (Computers for Social Development) should be a required course and those who had the opinion that this course should be a selective one, a forward stepwise logistic regression analysis was conducted. The predictor variables were age, the perceived advantage of a computer, the perceived compatibility of a computer, the perceived complexity of using a computer, sex, the desired levels of computer knowledge, and students' jobs.

13 cases of the original 173 cases were omitted from the analysis due to missing data, resulting in 160 cases to be included in the analysis. Only one variable, the desired levels of computer knowledge, was selected in the final model. It was a categorical variable having four ranks and therefore transformed into three new variables. The first category-turned-dummy variable represented the level of being able to study the output; its coefficient was 1.0417. The knowledge at the level of being able to study outputs referred to having the knowledge to interpret the outputs but not knowing how they were produced; this was the lowest level. The second variable indicated the level of being able to tell other people how to produce the desired output, the coefficient of which was 1.5342. This level indicated not only the knowledge of studying outputs but also the knowledge of how they were generated, such as knowing the computer commands, and yet not being able to use a computer by themselves to the produce the wanted outputs. The third dummy variable denoted the level of being to use a computer by themselves; its coefficient was -0.2000. This level indicated sufficient knowledge of being able to both produce the desired outputs and study them. The last category was the level of wanting as computer knowledge as much as possible, indicating the knowledge beyond the minimum that should be known to produce and interpret the desired outputs. It did not have a new variable to be its representative; it became the reference category. Its coefficient, which the computer program did not provide and had to be calculated by hand, was the negative of the sum of all the other three dummy variables' coefficients-- that is, -2.3759 as calculated from -(1.0417 + 1.5342 + (-0.2000)). The correlation coefficient of the desired levels of computer knowledge was 0.3555.

It appeared that those who did not want much computer knowledge expressed the opinion that SD. 502 should be a selective course, whereas those who craved for computer knowledge wanted it to be a required course.

Table 22 Means and Standard Deviations of the Independent Variables Used in the Logistic Regression Analysis of the Opinion about SD. 502 [1]

Independent variables	Means	Standard deviation	Minimum	Maximum
Age	33.42	7.23	22	58
Relative advantage	4.46	0.67	1	5
Compatibility	4.15	0.92	1	5
Complexity	3.06	0.73	1	5
Sex (male = 1)	0.48	0.50	0	1
Desired levels of computer knowledge [2]				
being able to interpret outputs	0.06	0.24	0	1
being able to tell how to produce the desired outputs	0.15	0.35	0	1
being able to use computers by themselves	0.36	0.48	0	1
wanting computer knowledge as much as possible	0.43	0.49	0	1
Students' jobs [2]				
no jobs	0.11	0.31	0	1
at the low level	0.23	0.42	0	1
at the middle level	0.53	0.50	0	1
at the high level	0.11	0.32	0	1

1 The tested event was the opinion that SD 502 should be a selective course.

2 Student's jobs and desired levels of computer knowledge were categorical variables, and each was transformed into a set of deviation contrast with the last category as the reference category.

Table 23 Variables Included in the Logistic Regression Model of the Opinion about SD. 502

Variables	Step	β	Wald	R	Significance
Desired levels of computer knowledge		28.1643	.3555	.0000	
being able to interpret outputs		1.0417	3.9805	.1063	.0460
being able to order the desired outputs		1.5342	16.1377	.2839	.0001
being able to use computers by themselves		-.2000	.3496	.0000	.5672
wanting computer knowledge as much as possible		-2.3759			
(Constant)		-1.0417	14.9427		.0001

A great majority (86.89 %) of those who wanted SD. 502 to be a required course were correctly classified, while a slight majority (60.53 %) of those who believed that SD. 502 should be a selective course were correctly identified. The overall correct classification rate was 80.63 %.

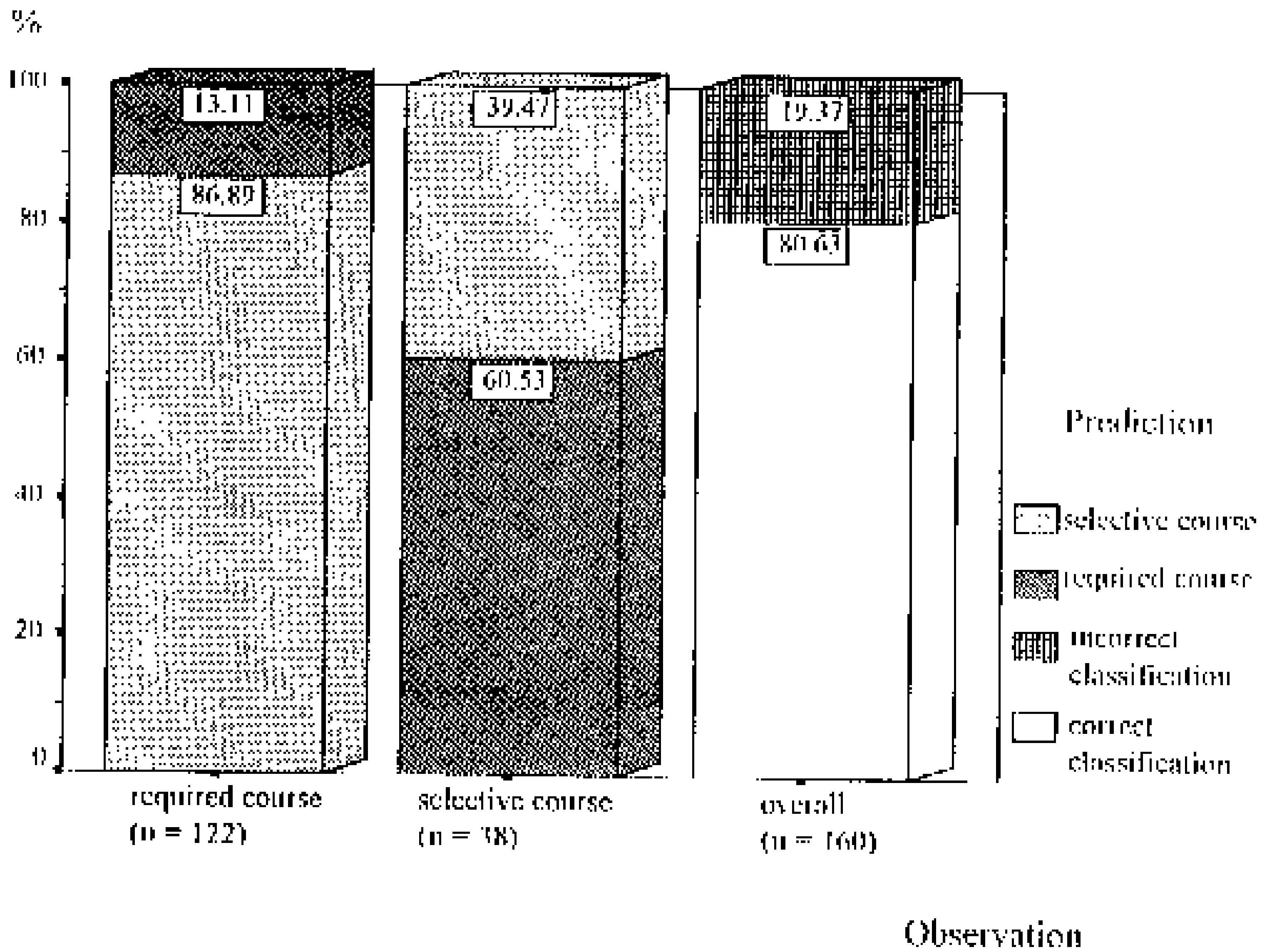


Figure 28 The Classification Results of the Logistic Regression Analysis for Opinions about SD. 502 (Computers for Social Development)

The survey analysis revealed that about 37 % of all students wanted to have computer knowledge at the levels of being able to interpret outputs or of being able to tell how the computer personnel how to produce the desired outputs. The rest (63 %) wanted to have more computer knowledge; they wanted to possess computer knowledge to enable themselves to use a computer on their own or to possess computer knowledge as much as possible.

Table 24 The Desired Levels of Computer Knowledge

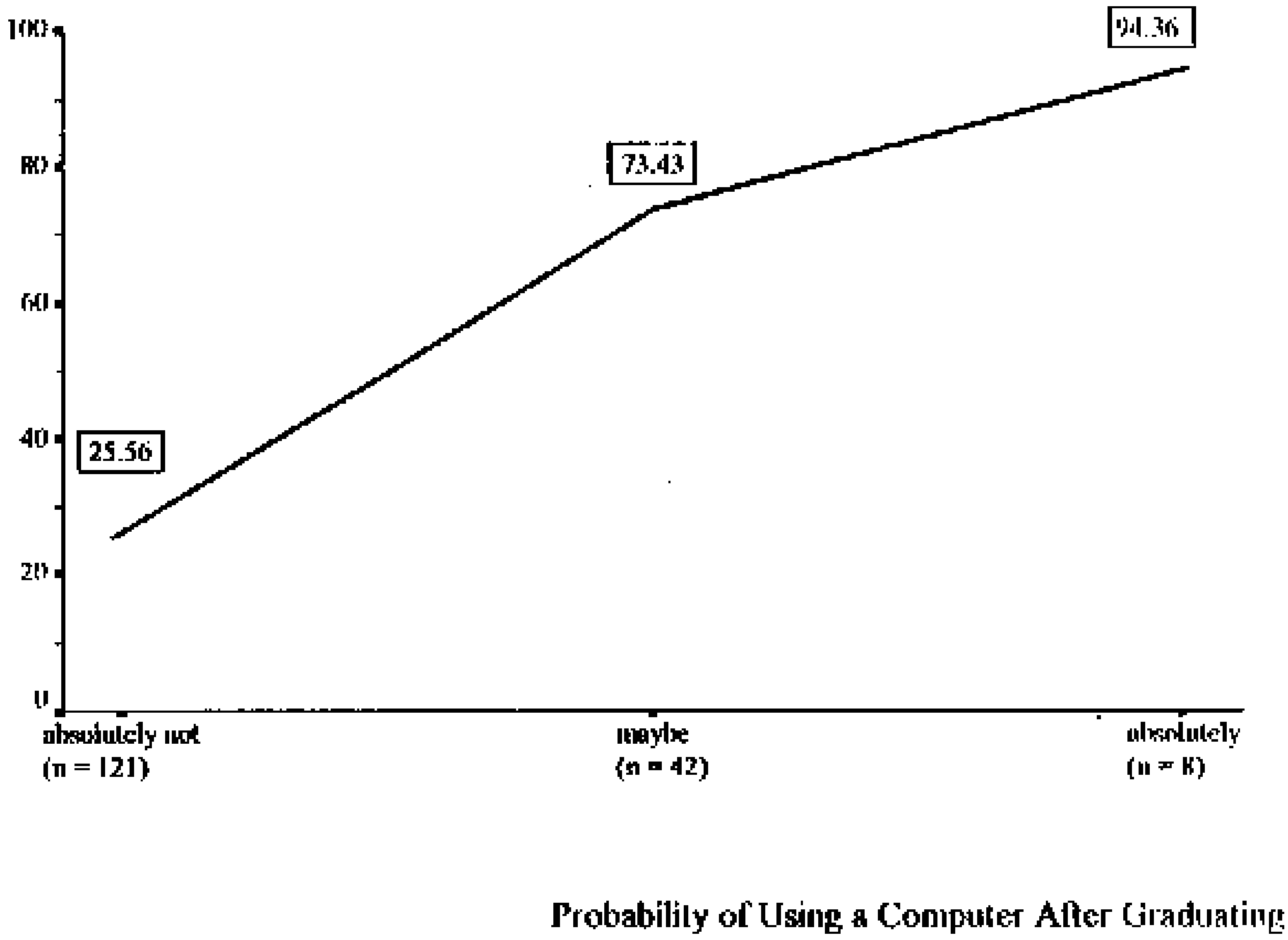
The Desired Levels of Computer Knowledge	n	percent
being able to interpret outputs or of being able to tell how the computer personnel how to produce the desired outputs	64	36.99
being able to use a computer on their own or wanting to possess computer knowledge as much as possible	109	63.01
Total	173	100.00

5. Students' Opinions about SD. 502

The Kruskal-Wallis one-way analysis of variance was performed to compare the desired levels of computer knowledge of students according to how likely they were going to use a computer again after graduating. This procedure was chosen because the desired levels of computer knowledge was an ordinal variable and the group of students who said that they would absolutely not use a computer again after graduating accounted for a very small number, only eight cases.

It was discovered that the more likely students believed they would have a chance to use a computer again after graduating, the more computer knowledge they wanted to have. The mean rank of those who said they would absolutely use a computer again was 92.36, compared to 74.43 and 25.56 of those stating that they might use a computer again and of those saying they would certainly not use a computer again, respectively. The chi-square statistics was 20.63 with df = 2 and the observed significance level of .0000.

The Desired Levels of Computer Knowledge (Mean Ranks)



χ^2 = 20.63
d.f = 2
p = .0000

Figure 29 Mean Ranks of the Desired Levels of Computer Knowledge by Probability of Using a Computer After Graduating

CHAPTER V

CONCLUSIONS AND SUGGESTIONS

1. Conclusions

The main objectives of this study were threefold. 1) to explore the state of the use of computers of the students of the School of Social Development of the National Institute of Development Administration; 2) to examine factors affecting attitude toward computers; and 3) to investigate these students' opinion about SD. 502 (Computers for Social Development).

The population of the study comprised all students of the normal program and the special program of the School of Social Development of the National Institute of Development Administration in Bangkok. The accidental sampling technique was used to gather the sample, which consisted of 173 cases. A questionnaire was constructed for collecting the data.

The summary findings were as follows:

1.1 Characteristics of the Sample

The sample consisted of 173 students, the majority of whom (63.6 %) were students of the regular program and the rest of whom (36.4 %) were students of the special program. There were almost equal numbers of male and female students, 50.9 % were male and 49.1 % were female. On the average, the students were 34 years old. Most students were either single (49.7 %) or married (45.8 %), a few (3.5 %) were separated, divorced or widowed. Almost half (45.3 %) of all students both worked and studied, 34.3 % were on study leave, 11.0 % quit their jobs in order to study, and only 9.3 % never worked. The students who did not work while studying had an average income of 4,600 baths a month, those who had a job at the low level (e.g. ordinary employees and civil servants of class 2, 3 or 4) earned about 9,600 baths a month, those who had a job at the middle level (e.g. foremen, supervisors and civil servants of class 5 or 6) made almost 12,000 baths a month, and those who had a job at the high level (e.g. company owners, managers and civil servants of class 7 or 8) earned about 25,000 bahts a month. Only about one-fourth (26.0 %) had a home computer while the rest (74.0 %) did not.

The average level of innovativeness of the students was at the rather high level (mean = 3.83), and the average level of attitude toward computers was at the high level (mean = 4.08).

Testing Hypothesis 1

The stepwise regression analysis was used to test hypothesis 1 that attitude toward computers had an association with the individual's characteristics. The results showed that innovativeness, not sex or age, had a weak relationship with attitude toward computers. Innovativeness accounted for 35 % variation in attitude toward computers. This finding also confirmed Rogers' theory that individuals with high levels of innovativeness were earlier in adopting new ideas than others with low levels of innovativeness. These more innovative students had high awareness of the benefits of a computer. They liked the computer technology. And they would try to put a computer to good use.

1.2 Characteristics of the Innovation

About half (55.5 %) of the students perceived a very high level of usefulness of a computer, 35.1 % believed that a computer was quite useful, 7.6 % answered that a computer was moderately useful, 1.2 % and 0.6 % expressed a low and a very low level of usefulness of computers, respectively.

Regarding the compatibility of a computer, 43.3 % believed that they could apply it for their tasks very extensively, 36.3 % said a computer was rather compatible, 14.6 % felt that a computer was moderately compatible and 3.5 % and 2.3 % gave an opinion that a computer was of little and very little compatibility, respectively.

Another characteristic of the innovation was complexity. 4.1 % answered that it was very difficult to use a computer, and 12.9 % said that it was quite difficult to use a computer. Using a computer was neither too difficult nor too easy for 63.1 %.

About 15.8 % stated that it was easy to use a computer, and 4.1 % thought that it was very easy to use a computer.

These findings supported past researches that many individuals perceived the benefits of a computer, knew that a computer could be applied for their tasks but envisioned difficulty with using this innovation technology.

1.3 The Adoption of the Use of Computers

Most students had adopted the computer technology. Of these students, however, there were more students who did not intend to use it of their own free will but adopted it because they were required or forced to do so.

Testing Hypothesis 2

The discriminant analysis results showed that students who adopted the use of computers were very young and more innovative and had a high favorable attitude toward computers, students who adopted the use of computers because they were compelled to or could not help but have to use a computer for their tasks were older and less innovative and had a lower level of positive attitude toward computers, and students who had not yet adopted the use of computers were oldest and least innovative by far and had a very low level of positive attitude toward computers. However, the power of classification was not great. Only 57.23 % were correctly identified, these findings could increase the correct classification rate by 24 %. The results partly supported hypothesis 2. Only age, innovativeness, and attitude toward computers had an association with the adoption of the use of computers.

One more procedure was performed to find other ways to distinguish between students with different types of innovation decisions. The graphic crosstabulation between types of innovation decisions and students' jobs showed that they were associated. Students who had a job at the high level were more likely to adopt the use of computers either because they were forced to use computers for their work or because they had to study SD. 502. The analysis results might then be inferred that if these students had not furthered their study at the master degree level, they still would have not put a computer to use but might have used it later when their tasks required them to use a computer. In contrast, students who never worked or who had a job at the low level were more likely to adopt the use of computers because they wanted to. The reason might be that the students who had just received bachelor's degree and never worked and those who had a job at the low level acquired computer knowledge because they believed that having computer knowledge meant better working opportunities. This indicated that time played a role here. Students with no jobs or with a job at the low level were probably young and had more free time to further studies about computers while students with jobs at the higher level might be older and had such a lot of responsibilities that did not enable them to afford the time to gain computer knowledge.

1.4 Using Computers

Only three kinds of the use of computers were reported: printing, calculation, and information retrieval. No one used a computer for self-study. Most students used a computer by themselves to a certain extent while some students did not use a computer by themselves at all. The logistic regression analysis was performed to examine differences between these two groups of students.

Seven independent variables were used as predictors: age, the perceived advantage of computers, the perceived compatibility of computers, the perceived complexity of using computers, sex, types of students, and jobs. These predictor variables were used to differentiate students using computers differently for each kind of the computer use. The findings were as follows (the variables were arranged in order of the magnitude of partial correlation):

Whether students used a computer by themselves for printing was a function of the perceived complexity of using computers, types of students, and age.

Whether students used a computer by themselves for calculation was a function of the perceived complexity of using computers, age, and the perceived compatibility of computers.

Whether students used a computer by themselves for retrieval was a function of the perceived complexity of using computers, types of students, and the perceived advantage of computers.

The perceived complexity was found to be a major factor affecting the ways students used a computer for all kinds of the computer use. The students were more likely to use a computer to a certain extent if they believed that using a computer was not difficult.

Apart from the perceived complexity of using a computer, ways of using a computer for printing and for retrieval were affected by types of students. It might be that students of the regular program had more free time than their counterparts of the special program as the latter had to work on weekday and study on weekend. Having more free time, students of the regular program tried to use a computer by themselves to a certain extent for a printing job, which had to take some time to do. Regarding using a computer for information retrieval, students had to gain this service at the library. Students of the students program, who usually studied all day long on weekend, might not be able to find time to use a computer for retrieval by themselves.

Age was found to affect ways the students used a computer for printing and for calculation. This might indicate that younger students were quicker and better at using a computer.

The last factor that affected ways of using a computer for calculation was the perceived compatibility of a computer and that for retrieval was the perceived advantage of a computer. This showed that these factors were less important than others in accounting for the variation of ways of using a computer.

Regarding the person who did a computer job for the students when they did not use a computer by themselves, the analysis result were as follows:

1) For printing, most students who did not at all use a computer by themselves hired someone else or had personnel in charge do the task, if they had some. When those students who at least used a computer by themselves to a certain extent did not want to use it by themselves, they tend to ask their friends to help or have personnel in charge do the tasks rather than hire typists.

2) For calculation, most students of the two groups had their friends or personnel in charge do the computer work. Only a few hired someone else to do the calculation jobs by computers. This pointed out that unlike using a computer for printing that mostly exercised physical ability or handiness, using a computer for calculation involved mental skills or mastery. Therefore, when the students did not (want to) perform the calculation job by themselves, they could not have general others do the job but had to turn to someone whom they could trust such as their friends who were good at computers.

3) For information retrieval, most students who did not at all use a computer by themselves had their friends or the librarians do this work for them and some used the service from personnel in charge of doing the task. Those who used a computer by themselves to a certain degree had either their friends or the librarians or both do this task when they did not or could not do it by themselves. This showed that those who did not use a computer by themselves let anybody available help do the task while those who used a computer by themselves to a certain degree resorted to only their friends or the librarians after they had tried to search the desired information but not succeeded.

Of students who used a computer by themselves to a certain extent meant that some students always used it by themselves while some students at least sometimes used it by themselves. In order to recognize differences between those two groups of students concerning reasons of their ways of using a computer, all ways of using a computer were classified into three different groups to be used in place of two groups used in the analysis earlier. These three groups were: 1) completely using a computer by themselves; 2) not using a computer by themselves at all; and 3) partly using a computer by themselves.

It was discovered that for all three kinds of the computer use, most students who always used a computer by themselves gave the reason that it was convenient to do the task on their own and that they could produce a better output when they used a computer by themselves. On the other hand, most students who did not at all use a computer by themselves reported the reasons that they could not use a computer to produce the desired results and that they had personnel in charge do the tasks for them. Most students who sometimes used a computer by themselves and sometimes had someone else do the computer work expressed a combination of reasons of the two groups above. In other words, they used a computer by themselves if it was convenient or if they could generate better results but had others do the computer work they did not how to do it or let personnel in charge do the work for them.

However, some students who did not use a computer by themselves now expressed that in the future they would try to use it to some degree. And almost all students who used a computer by themselves now said that they would continue to use it by themselves in the future. This supported the findings of past researches that many individuals wanted to use a computer but lacked the skills. These students who did not use a computer by themselves now would probably acquire some computer knowledge to enable themselves to use a computer to a certain degree.

Regarding how students gained computer knowledge, if studying SD 502 was excluded, most students who never worked and who had a job at the low level studied computers at a university or a computer school and only a few students who had a job at the higher level had a chance to study at such places. Those students who had a job at the higher level were more likely to be trained on the job. A lot of students of each level of job positions studied computers by themselves and received some computer knowledge from their friends these findings reflected the same thing as did the discriminant analysis results. Time was a factor affecting the adoption of the use of computers. Those students who never worked and who had a job at the low level and probably had more time were more likely to study computers at an educational institution—that is, a university or computer school—whereas those students who had a job at the higher level and probably had many other responsibilities the former did not have were less likely to take a computer course from an education institution and had to trained on the job. But all students, regardless their job positions, tried to gain computer knowledge by self-studying and from their friends

To find out where the School's students used a computer most often, only students who had studied at least for one semester were used in the analysis. Most students who did not have a home computer were reported to use a computer at the School's lab most often. Even though students had a home computer, a lot of them, not most, were also reported to use a computer at the School's lab most frequently. Some students used a computer at their workplace most often. Only a few students used a computer at the ISEC rooms, the library, or a friend's house most frequently. This indicated that the School' lab was a favorite place to use a computer to many students

Most students of the School, excluding the fresh recruits, expressed that there were too few computers for students to use in the School's lab. The slight minority disagreed

It was certain that in comparison with the students who had studied at least for one semester, the fresh recruits must have used a computer for other reasons than studying. These two groups were then compared to find out differences regarding the trouble of using a computer. The results showed that most students of the two groups had difficulty with solving computer problems and did not have enough knowledge to use a computer to produce what they had in mind. Many students of both groups had difficulty gaining access of a computer, irrespective of where they used a computer. Apart from these three problems, students of both two groups had other similar problems such as lack of knowledge in studying computer outputs. Some main problems that a lot of students of one group had while only a few in the other group did were problems about rules of gaining the computer access, the poor condition of computers and peripherals, and computer support. Only a few fresh recruits had a problem about rules of gaining the computer access while quite a few second-or-other-semester students did have this problem. Some fresh recruits had a problem about poor condition of computers but only a few had a problem about poor condition of peripherals; the reverse was true second or other-semester students. Many fresh recruits had a problem about lack of computer provision and lack of advice to use a computer, but not many second-or other semester students had these problems

These results indicated that no matter what the students used a computer for and where they used it, most students had similar problems about computer knowledge and gaining access to computers but had other different problems depending on where they used a computer

Regarding suggestions about the use of a computer, these two groups if students also expressed similar suggestions. They wanted more convenience in gaining access to computers. They suggested providing computer books, printer manuals, and computer personnel in the computer lab. They also wanted computers to be in good condition or modern computers. However, many second-or-other-semester students expressed that they wanted the School to teach other essential computer programs that are widely used. While not many fresh recruits gave this same suggestion. Concerning kinds of the computer use, only a few students of both groups stated that they wanted support of using a computer for printing their papers by themselves. More fresh recruits second or-other-semester students were reported to express that the School should support students to use a computer for statistical calculation and to perform statistical analysis on their own. These findings revealed that overall the students wanted to have a well conditioned computer lab, but more fresh recruits than other students wanted support of using a computer.

1.5 Students' Opinions about SD. 502

Now the course of SD. 502 (Computers for Social Development) was a required course. The logistic regression analysis results discovered that opinions that whether this course should be a required or selective one were a function of the levels of computer knowledge that the students wanted to have. Students who wanted less computer knowledge wanted this course to be a selective one while students who wanted to have a lot of computer knowledge wanted this course to be a required one.

However, it was also found that the desired levels of computer knowledge were a function of the possibility of using a computer after graduating. Students who believed that they were more likely to use a computer again after graduating wanted a very high level of computer knowledge while students who believed that they were less likely to have a chance to use a computer again in the future wanted a lower level of computer knowledge.

Therefore, it might be concluded that whether SD. 502 should be a required or selective course was a function of the level of computer knowledge the students wanted to have, which in turn was a function of how likely they would use a computer again after graduating. Some students wanted SD. 502 to be a required course because they wanted a great deal of computer knowledge and in turn because they were more likely to use a computer again after graduating whereas some students wanted

SD. 502 to be a selective course because they wanted a small amount of computer knowledge and in turn because they were less likely to use a computer again after graduating.

2. Suggestions

It was discovered that students' opinions regarding whether SD. 502 should be a required or selective course were a function of the desired level of computer knowledge and the probability of using a computer in the future after graduating. Therefore, if the School wanted to offer the curriculum that suited the needs of the students, SD. 502 should be a selective course. This would allow students who wanted only a little amount of computer knowledge because they believed that would get involved with computers to a small degree in the future to have an alternative to choose whether they wanted to study about computers of other courses which seemed more important to them.

On contrary, if the School wanted to provide knowledge that all students of the School should possess to be able to survive in the world that was becoming more and more globalized, the School should offer two different computer courses: one as a required course and one as a selective course. As the government began to see the importance of the computer technology and the role it could play in the country's development, there would be a growing need of computer personnel. Knowledge of computers would become a must rather than an advantage for working. Note that one of the findings of the study showed that students who had a job at the higher level were less likely to study computers from a formal institution—in this case, a computer school. Most of them were self-taught or trained on the job. In contrast, students who never worked or had a job at the lower level were more likely to take a computer course at a computer school. It could then be inferred that if SD. 502 was a selective course and some students did not take it, they would have to be trained on the job or have to study computers by themselves when they had to adopt the use of computers because of their work in the future. In other words, they would have to start from zero. It would be better if they had some backgrounds in computers to do the tasks. These computer backgrounds would enable these students to adapt more easily to their computerized working environment.

Therefore, when these students had an opportunity to study at a formal institution---that is, at the School--they should receive computer knowledge to prepare for the future that demanded computer literacy. This was the reason that SD. 502 should be a required course.

If SD. 502 was a required course on the basis of the reason above, the question was then how much computer knowledge that an average student should have. Another one of the findings showed that some students used a computer by themselves because they could produce a better output, that some students did not know how to use a computer for the desired results, and that some students had subordinated to use a computer for them. This finding, together with others, made the researcher feel that SD. 502 as a required course should offer the computer knowledge in two areas:

1) The knowledge to communicate the students' ideas and objectives to computer personnel, engineers or specialists. The students should be able to convey what they had in mind and wanted the computer personnel to do. Several cases were reported about the misunderstanding between computer specialists and their clients. For instance, computer specialists might make a perfect computer-produced output, only to find out later that they misinterpreted their clients' objectives and requests.

2) The knowledge to evaluate the accuracy and validity of computer-produced outputs. This skill was especially important in the case that students did not operate a computer by themselves and had someone else generate the desired outputs. The students had to know how to make sure that these outputs were correctly produced and free of errors. Many cases were also found that a person presented an excellent-sounding report with unknowing false conclusion based on an erroneous computer output.

While SD. 502 as a required course should enable the students to have the skills and understanding to communicate with computer specialists and to evaluate the accuracy to the computer outputs, another computer course as a selective one should afford the students the knowledge to be able to use a computer by themselves to produce a better output. As studying involved using computers in one way or another, students who just did not want to use a computer by themselves should know how to have someone else do the computer jobs and how to evaluate the results by studying SD. 502 as a required course, and students who wanted to use a computer by themselves should gain more knowledge to produce better outputs by taking another computer course as a selective course.

To sum up, the School should offer two different computer courses—one as a required course and one as a selective course—to suit the students' needs and to prepare the students for the computerized society.

The aforementioned suggestion concerned the course of SD. 502 under the School's curriculum. The suggestions to accommodate the use of computers were as follows:

1) More computers should be supplied in the School's computer lab.

2) The School's computer lab should be furnished with computer books, printer manuals, and other pertinent computer-related literature. They might substitute computer personnel that the School could not afford.

3) Rules should be set to allow students to gain the computer access at the School's computer lab more conveniently, and the students should know how to share the computers.

4) The School's computers and peripherals should be well maintained. The students should help take good care of the computers and peripherals.

APPENDIX

แบบสำรวจ

โปรดทำเครื่องหมาย ✓ ใน ☐ หรือเติมคำตอบลงในช่องว่างตามความเป็นจริง

I. ด้านชีวสังคม

1. เพศ ☐ ชาย ☐ หญิง

2. อายุ __________ ปี

3. นักศึกษา ☐ ภาคปกติ รุ่นที่ ☐ 18 ☐ 17 ☐ 16 ☐ 15 ☐ 14 ☐ 13 ☐ ______
☐ ภาคพิเศษ รุ่นที่ ☐ 4 ☐ 3 ☐ 2 ☐ 1

4. สถานภาพสมรส ☐ โสด
☐ แต่งงาน
☐ หม้าย / หย่า / แยกกันอยู่

5. การทำงาน
5.1 ☐ ไม่เคยทำงาน (กรุณาข้ามไปตอบข้อ 5.2.4)
☐ เคยทำงาน แต่ลาออกเพื่อศึกษาต่อ
☐ ทำงานด้วยเรียนด้วย
☐ ลามาเพื่อศึกษาต่อ

5.2 ลักษณะงานในข้อ 5.1
5.2.1 ☐ งานภาคราชการหรือรัฐวิสาหกิจ
ระดับ ☐ ซี 4 ☐ ซี 5 ☐ ซี 6 ☐ ซี 7 ☐ ซี 8 ☐ ซี ____

☐ งานภาคเอกชน
ระดับ ☐ ผู้บริหารระดับสูง ☐ ผู้บริหาร ☐ ผู้บังคับบัญชา ☐ พนักงาน ☐ ______________

5.2.2 ตำแหน่ง ____
5.2.3 ลักษณะของงานที่ทำโดยสังเขป ______________________________________
____
5.2.4 รายได้ ______________________ บาท/เดือน

6. โปรดทำเครื่องหมาย ✓ ในช่องที่ตรงกับความคิดเห็นของท่านมากที่สุด

	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	เห็นด้วย	เห็นด้วยอย่างยิ่ง
6.1 การที่จะประสบความสำเร็จนั้น ขึ้นอยู่กับความขยันหมั่นเพียร ไม่เกี่ยวกับโชคลาภวาสนา				
6.2 ข้าพเจ้ามีความกระตือรือร้นที่จะลองทำในสิ่งใหม่ ๆ				
6.3 ข้าพเจ้าไม่ชอบติดตามข่าวสารต่าง ๆ				
6.4 ไม่ว่าจะทำอะไรก็ตาม ข้าพเจ้าชอบทำให้แค่เสร็จก็พอ ไม่จำเป็นต้องให้ดีที่สุด				
6.5 การทำอะไรในทำนองเดียวกันกับที่คนอื่น ๆ เขาทำกัน ดีกว่าการทำในสิ่งที่แตกต่างไปจากผู้อื่น				
6.6 การแก้ปัญหาที่ยุ่งยากและซับซ้อน สนุกกว่าการแก้ปัญหาง่าย ๆ				
6.7 ข้าพเจ้าชอบคิดค้นหาวิธีใหม่ ๆ ที่จะเพิ่มพูนประสิทธิภาพในการทำงานของตนเอง				
6.8 ถึงแม้ว่าแนวความคิดหรือแผนการณ์ของข้าพเจ้าจะไม่ได้รับการสนับสนุน ข้าพเจ้าก็จะยังคงดำเนินตามความคิดเดิมต่อไป				
6.9 ข้าพเจ้ามีนิสัยไม่ชอบค้นคว้าหาความรู้เพิ่มเติม				
6.10 อนาคตขึ้นอยู่กับโชคชะตา				
6.11 ข้าพเจ้ามักจะทำในสิ่งที่ตนเองคิดว่าถูกต้อง ไม่ว่าผู้อื่นจะคิดอย่างไรก็ตาม				
6.12 ข้าพเจ้าเชื่อในคำกล่าวที่ว่า "ไม่ลองไม่รู้" ข้าพเจ้าจึงมีนิสัยชอบเสี่ยงลองดู				
6.13 ข้าพเจ้าชอบทำในสิ่งที่ตนเองคุ้นเคยมากกว่าการทำในสิ่งใหม่ ๆ ที่ไม่คุ้นเคย				
6.14 เวลาทำงาน ข้าพเจ้าชอบคำนึงถึงปริมาณมากกว่าคุณภาพ				

II. <u>การนำคอมพิวเตอร์มาใช้</u>

7. ***ครั้งแรก***ที่ข้าพเจ้าเริ่มนำคอมพิวเตอร์มาใช้งานอย่างจริง ๆ จัง ๆ หรือเริ่มเรียนคอมพิวเตอร์เพราะ

(***ตอบได้เพียงคำตอบเดียวเท่านั้น***)

- ☐ ข้าพเจ้ายังไม่เคยนำคอมพิวเตอร์มาใช้งานเลย และ/หรือยังไม่เคยเรียนคอมพิวเตอร์ (กรุณาข้ามไปตอบข้อ 9)
- ☐ จำเป็นต้องเรียนวิชา พค. 502 ซึ่งเป็นวิชาบังคับ
- ☐ ต้องการนำมาใช้หรืออยากเรียนเอง ไม่มีใครบังคับ
- ☐ ข้าพเจ้าได้เห็นคุณประโยชน์จากการไปชมนิทรรศการเกี่ยวกับคอมพิวเตอร์
- ☐ คนในครอบครัว (เช่น พ่อ แม่ พี่น้อง) ชักชวนให้ทดลองใช้คอมพิวเตอร์ที่บ้าน
- ☐ งานที่ทำอยู่เกี่ยวข้องหรือต้องใช้คอมพิวเตอร์
- ☐ (ระบุ) ________________________________

8. กรุณาตอบคำถาม 3 ข้อต่อไปนี้ตามความเป็นจริงหรือตามความคิดเห็นของท่านที่มีในช่วงเวลา*__ก่อนหน้าที่ท่านจะเริ่มนำคอมพิวเตอร์มาใช้งานอย่างจริง ๆ จัง ๆ หรือเริ่มเรียนคอมพิวเตอร์__*

8.1 ข้าพเจ้าคิดว่าคอมพิวเตอร์มีประโยชน์ต่อการทำงานและ/หรือการเรียน(ไม่รวมวิชา พค. 502)ของข้าพเจ้า

☐ น้อย ☐ ค่อนข้างน้อย ☐ ปานกลาง ☐ ค่อนข้างมาก ☐ มาก

8.2 ข้าพเจ้าสามารถนำความรู้ทางคอมพิวเตอร์มาใช้ในการทำงานและ/หรือการเรียน(ไม่รวมวิชา พค. 502)ของข้าพเจ้าได้

☐ น้อย ☐ ค่อนข้างน้อย ☐ ปานกลาง ☐ ค่อนข้างมาก ☐ มาก

8.3 ข้าพเจ้าคิดว่าการเรียนและ/หรือการใช้คอมพิวเตอร์เป็นเรื่อง

☐ ง่ายมาก ☐ ง่าย ☐ ไม่ง่ายจนเกินไปและก็ไม่ยากจนเกินไป ☐ ยาก ☐ ยากมาก

9. กรุณาตอบคำถาม 3 ข้อต่อไปนี้ตามความเป็นจริงหรือตามความคิดเห็นของท่านที่มีใน*ปัจจุบันหรือในขณะนี้*

9.1 ข้าพเจ้าคิดว่าคอมพิวเตอร์มีประโยชน์ต่อการทำงานและ/หรือการเรียน(ไม่รวมวิชา พค. 502)ของข้าพเจ้า

☐ น้อย ☐ ค่อนข้างน้อย ☐ ปานกลาง ☐ ค่อนข้างมาก ☐ มาก

9.2 ข้าพเจ้าสามารถนำความรู้ทางคอมพิวเตอร์มาใช้ในการทำงานและ/หรือการเรียน(ไม่รวมวิชา พค. 502)ของข้าพเจ้าได้

☐ น้อย ☐ ค่อนข้างน้อย ☐ ปานกลาง ☐ ค่อนข้างมาก ☐ มาก

9.3 ข้าพเจ้าคิดว่าการเรียนและ/หรือการใช้คอมพิวเตอร์เป็นเรื่อง

☐ ง่ายมาก ☐ ง่าย ☐ ไม่ง่ายจนเกินไปและก็ไม่ยากจนเกินไป ☐ ยาก ☐ ยากมาก

10. ข้าพเจ้าเรียนเกี่ยวกับคอมพิวเตอร์ โดย (*__ตอบได้มากกว่า 1 คำตอบ ตามความเหมาะสม__*)

☐ ยังไม่เคยเรียน
☐ เรียนด้วยตนเอง
☐ เรียนเป็นวิชาหนึ่งตามหลักสูตรสมัยเรียนปริญญาตรี
☐ เรียนที่ NIDA
☐ เรียนตามโรงเรียนสอนคอมพิวเตอร์
☐ พ่อ แม่ หรือพี่น้องสอน
☐ เพื่อนสอน
☐ (ระบุ) ______________________________

11. ที่บ้านของข้าพเจ้า ☐ ไม่มีคอมพิวเตอร์
☐ มีคอมพิวเตอร์ โดย ☐ เป็นของข้าพเจ้าเอง
☐ เป็นของผู้อื่น

12. สถานที่ที่ข้าพเจ้าสามารถใช้คอมพิวเตอร์ได้ (*__ตอบได้มากกว่า 1 คำตอบ ตามความเหมาะสม__*)

☐ ยังไม่เคยใช้คอมพิวเตอร์ ☐ ที่บ้านตนเอง ☐ ที่ทำงาน ☐ ที่คณะ
☐ ที่ห้องคอมพิวเตอร์แล็ปของนิด้า ☐ ที่ห้องสมุดนิด้า ☐ ที่บ้านเพื่อน ☐ (ระบุ) ____________________

แต่ข้าพเจ้าใช้คอมพิวเตอร์*มากที่สุดหรือบ่อยที่สุด*ที่ (*__ตอบได้เพียงคำตอบเดียวเท่านั้น__*)

☐ ยังไม่เคยใช้คอมพิวเตอร์ ☐ ที่บ้านตนเอง ☐ ที่ทำงาน ☐ ที่คณะ
☐ ที่ห้องคอมพิวเตอร์แล็ปของนิด้า ☐ ที่ห้องสมุดนิด้า ☐ ที่บ้านเพื่อน ☐ (ระบุ) ____________________

13. ข้าพเจ้าคิดว่าข้าพเจ้า

- ☐ ไม่จำเป็นต้องมีความรู้ด้านคอมพิวเตอร์
- ☐ ควรมีความรู้ด้านคอมพิวเตอร์ในระดับที่สามารถอ่านผล (output) ของการใช้คอมพิวเตอร์ได้ก็เพียงพอแล้ว
- ☐ ควรมีความรู้ด้านคอมพิวเตอร์ในเพียงระดับที่สามารถสั่งหรือจ้างผู้อื่นทำในสิ่งที่ตนต้องการได้ก็เพียงพอแล้ว
- ☐ ควรมีความรู้ด้านคอมพิวเตอร์ในระดับที่สามารถทำให้ข้าพเจ้าทำในสิ่งที่ตนต้องการได้
- ☐ ควรมีความรู้ด้านคอมพิวเตอร์ให้มากที่สุดเท่าที่จะมากได้
- ☐ (ระบุ) ____

14. ในอนาคตภายหลังจากเรียน(ปริญญาโท)จบ ข้าพเจ้าคิดว่า

- ☐ ข้าพเจ้าจะต้องได้ใช้คอมพิวเตอร์ในการทำงานอีกแน่นอน
- ☐ ข้าพเจ้าอาจจะต้องใช้คอมพิวเตอร์ในการทำงานอีก
- ☐ ข้าพเจ้าไม่จำเป็นจะต้องใช้คอมพิวเตอร์ในการทำงานอีกต่อไป

15. ***ในขณะนี้หรือในปัจจุบันนี้*** ท่านเคยนำคอมพิวเตอร์มาใช้งานดังต่อไปนี้ คือ (*ตอบได้มากกว่า 1 คำตอบ ตามความเหมาะสม*)
(**ถ้ายังไม่เคยนำคอมพิวเตอร์มาใช้ กรุณาข้ามไปตอบข้อ 16**)

ประเภทที่ใช้	วิธีที่ใช้	เหตุผล
☐ ด้านงานพิมพ์	☐ ทำด้วยตนเองทั้งหมด ☐ ให้ผู้อื่นทำให้ทั้งหมด โดยผู้ที่ทำให้คือ ☐ เพื่อน ☐ ลูกน้อง ☐ จ้างเขาทำ ☐ (ระบุ) ________ ☐ ทั้งทำเองและให้ผู้อื่นทำให้ โดยผู้ทำให้คือ ☐ เพื่อน ☐ ลูกน้อง ☐ จ้างเขาทำ ☐ (ระบุ) ________	☐ ทำด้วยตนเองสะดวกดี ☐ ทำด้วยตนเองทำได้ดีกว่าให้คนอื่นทำ ☐ ประหยัดกว่าการ(จ้าง)ให้คนอื่นทำให้ ☐ ไม่สามารถทำเองได้ ☐ ไม่มีเครื่องคอมพิวเตอร์ให้ทำทั้ง ๆ ที่สามารถทำเองได้ ☐ ให้ผู้อื่นทำให้ในกรณีที่ต้องใช้เทคนิคขั้นสูงที่ทำเองไม่เป็น ☐ จ้างเขาทำสะดวกดี ☐ มีลูกน้องที่ทำหน้าที่นี้อยู่แล้ว จึงไม่จำเป็นต้องทำเอง ☐ พิมพ์ดีดไม่เป็นหรือไม่คล่อง ☐ (ระบุ) ________ ☐ (ระบุ) ________
☐ ด้านการคำนวณทางสถิติ	☐ ทำด้วยตนเองทั้งหมด ☐ ให้ผู้อื่นทำให้ทั้งหมด โดยผู้ที่ทำให้คือ ☐ เพื่อน ☐ ลูกน้อง ☐ จ้างเขาทำ ☐ (ระบุ) ________ ☐ ทั้งทำเองและให้ผู้อื่นทำให้ โดยผู้ทำให้คือ ☐ เพื่อน ☐ ลูกน้อง ☐ จ้างเขาทำ ☐ (ระบุ) ________	☐ ทำด้วยตนเองสะดวกดี ☐ ทำด้วยตนเองทำได้ดีกว่าให้คนอื่นทำ ☐ ประหยัดกว่าการ(จ้าง)ให้คนอื่นทำให้ ☐ ไม่สามารถทำเองได้ ☐ ไม่มีเครื่องคอมพิวเตอร์ให้ทำทั้ง ๆ ที่สามารถทำเองได้ ☐ ให้ผู้อื่นทำให้ในกรณีที่ต้องใช้เทคนิคขั้นสูงที่ทำเองไม่เป็น ☐ จ้างเขาทำสะดวกดี ☐ มีลูกน้องที่ทำหน้าที่นี้อยู่แล้ว จึงไม่จำเป็นต้องทำเอง ☐ พิมพ์ดีดไม่เป็นหรือไม่คล่อง ☐ (ระบุ) ________ ☐ (ระบุ) ________
☐ ด้านการค้นหาข้อมูลด้วยเครื่องคอมพิวเตอร์ (เช่น การใช้คอมฯ ในห้องสมุด)	☐ ทำด้วยตนเองทั้งหมด ☐ ให้ผู้อื่นทำให้ทั้งหมด โดยผู้ที่ทำให้คือ ☐ เพื่อน ☐ บรรณารักษ์ ☐ (ระบุ) ________ ☐ ทั้งทำเองและให้ผู้อื่นทำให้ โดยผู้ทำให้คือ ☐ เพื่อน ☐ บรรณารักษ์ ☐ (ระบุ) ________	☐ ทำด้วยตนเองสะดวกดี ☐ ทำด้วยตนเองทำได้ดีกว่าให้คนอื่นทำ ☐ ไม่สามารถทำด้วยตนเองได้ ☐ ให้ช่วยทำให้เฉพาะในกรณีที่ค้นหาด้วยตนเองแล้วแต่ยังไม่พบข้อมูลที่ต้องการ ☐ (ระบุ) ________ ☐ (ระบุ) ________ ☐ (ระบุ) ________
☐ ด้านการศึกษาความรู้ด้านต่าง ๆ ด้วยตนเองโดยใช้คอมพิวเตอร์	☐ (โปรดระบุวิธีการใช้และเหตุผลที่ใช้) ________	

18. *ในอนาคต* ข้าพเจ้าคิดว่าจะนำคอมพิวเตอร์มาใช้งานดังต่อไปนี้ (*ตอบได้มากกว่า 1 คำตอบ ตามความเหมาะสม*)

ประเภทที่ใช้	วิธีที่ใช้	เหตุผล
☐ ด้านงานพิมพ์	☐ ทำด้วยตนเองทั้งหมด ☐ ให้ผู้อื่นทำให้ทั้งหมด โดยผู้ที่ทำให้คือ ☐ เพื่อน ☐ ลูกน้อง ☐ จ้างเขาทำ ☐ (ระบุ) ____________ ☐ ทั้งทำเองและให้ผู้อื่นทำให้ โดยผู้ทำให้คือ ☐ เพื่อน ☐ ลูกน้อง ☐ จ้างเขาทำ ☐ (ระบุ) ____________	☐ ทำด้วยตนเองสะดวกดี ☐ ทำด้วยตนเองทำได้ดีกว่าให้คนอื่นทำ ☐ ประหยัดกว่าการ(จ้าง)ให้คนอื่นทำให้ ☐ ไม่สามารถทำเองได้ ☐ ไม่มีเครื่องคอมพิวเตอร์ให้ทำทั้ง ๆ ที่สามารถทำเองได้ ☐ ให้ผู้อื่นทำให้ในกรณีที่ต้องใช้เทคนิคขั้นสูงที่ทำเองไม่เป็น ☐ จ้างเขาทำสะดวกดี ☐ มีลูกน้องที่ทำหน้าที่นี้อยู่แล้ว จึงไม่จำเป็นต้องทำเอง ☐ พิมพ์ดีดไม่เป็นหรือไม่คล่อง ☐ (ระบุ) ____________ ☐ (ระบุ) ____________
☐ ด้านการคำนวณทางสถิติ	☐ ทำด้วยตนเองทั้งหมด ☐ ให้ผู้อื่นทำให้ทั้งหมด โดยผู้ที่ทำให้คือ ☐ เพื่อน ☐ ลูกน้อง ☐ จ้างเขาทำ ☐ (ระบุ) ____________ ☐ ทั้งทำเองและให้ผู้อื่นทำให้ โดยผู้ทำให้คือ ☐ เพื่อน ☐ ลูกน้อง ☐ จ้างเขาทำ ☐ (ระบุ) ____________	☐ ทำด้วยตนเองสะดวกดี ☐ ทำด้วยตนเองทำได้ดีกว่าให้คนอื่นทำ ☐ ประหยัดกว่าการ(จ้าง)ให้คนอื่นทำให้ ☐ ไม่สามารถทำเองได้ ☐ ไม่มีเครื่องคอมพิวเตอร์ให้ทำทั้ง ๆ ที่สามารถทำเองได้ ☐ ให้ผู้อื่นทำให้ในกรณีที่ต้องใช้เทคนิคขั้นสูงที่ทำเองไม่เป็น ☐ จ้างเขาทำสะดวกดี ☐ มีลูกน้องที่ทำหน้าที่นี้อยู่แล้ว จึงไม่จำเป็นต้องทำเอง ☐ พิมพ์ดีดไม่เป็นหรือไม่คล่อง ☐ (ระบุ) ____________ ☐ (ระบุ) ____________
☐ ด้านการค้นหาข้อมูลด้วยเครื่องคอมพิวเตอร์ (เช่น การใช้คอมฯ ในห้องสมุด)	☐ ทำด้วยตนเองทั้งหมด ☐ ให้ผู้อื่นทำให้ทั้งหมด โดยผู้ที่ทำให้คือ ☐ เพื่อน ☐ บรรณารักษ์ ☐ (ระบุ) ____________ ☐ ทั้งทำเองและให้ผู้อื่นทำให้ โดยผู้ทำให้คือ ☐ เพื่อน ☐ บรรณารักษ์ ☐ (ระบุ) ____________	☐ ทำด้วยตนเองสะดวกดี ☐ ทำด้วยตนเองทำได้ดีกว่าให้คนอื่นทำ ☐ ไม่สามารถทำด้วยตนเองได้ ☐ ให้ช่วยทำให้เฉพาะในกรณีที่ค้นหาด้วยตนเองแล้วแต่ยังไม่พบข้อมูลที่ต้องการ ☐ (ระบุ) ____________ ☐ (ระบุ) ____________ ☐ (ระบุ) ____________
☐ ด้านการศึกษาความรู้ด้านต่าง ๆ ด้วยตนเองโดยใช้คอมพิวเตอร์	☐ (โปรดระบุวิธีการใช้และเหตุผลที่ใช้) ____________	

IV. ทัศนคติต่อคอมพิวเตอร์

	ไม่เห็นด้วยอย่างยิ่ง	ไม่เห็นด้วย	เห็นด้วย	เห็นด้วยอย่างยิ่ง
1 คอมพิวเตอร์เป็นเครื่องมือที่มีประโยชน์				
2 การใช้คอมพิวเตอร์เป็นเรื่องที่ยุ่งยากและไม่สะดวก				
3 คอมพิวเตอร์มีประโยชน์ต่องานวิจัย				
4 คอมพิวเตอร์ดีกว่าเครื่องพิมพ์ดีดในด้านงานพิมพ์				
5 การคำนวณโดยใช้คอมพิวเตอร์ดีกว่าการคำนวณเองด้วยมือ				
6 ข้าพเจ้าไม่ชอบใช้คอมพิวเตอร์				
7 คนในตำแหน่งผู้บริหารไม่จำเป็นต้องมีความรู้ด้านคอมพิวเตอร์				
8 ข้าพเจ้าไม่จำเป็นต้องมีความรู้ทางคอมพิวเตอร์ก็สามารถก้าวไปสู่ตำแหน่งงานที่สูงกว่านี้ได้				
9 คอมพิวเตอร์มีประโยชน์ต่องานของข้าพเจ้า				
10 การใช้คอมพิวเตอร์ทำให้ข้าพเจ้าทำงานได้เสร็จไวขึ้น				
11 คอมพิวเตอร์เป็นเทคโนโลยีที่เหมาะสมกับยุคข่าวสารไร้พรมแดนในปัจจุบัน				
12 ข้าพเจ้าไม่สนใจเกี่ยวกับด้านคอมพิวเตอร์เลย				
13 ข้าพเจ้าจะพยายามหลีกเลี่ยงงานที่เกี่ยวข้องหรือต้องใช้คอมพิวเตอร์				
14 คอมพิวเตอร์สามารถนำมาประยุกต์ใช้เป็นอุปกรณ์ทางการศึกษาได้				
15 ความรู้ด้านคอมพิวเตอร์มีความสำคัญ				
16 ข้าพเจ้าจะแนะนำเพื่อนที่ยังไม่เคยเรียนคอมพิวเตอร์ให้มาเรียนคอมพิวเตอร์				
17 การเรียนคอมพิวเตอร์เป็นเรื่องน่าเบื่อ				
18 การเรียนการใช้คอมพิวเตอร์เป็นเรื่องที่ยาก				
19 ข้าพเจ้าจะพยายามนำคอมพิวเตอร์มาใช้งานเพื่อเพิ่มประสิทธิภาพในการทำงาน				
20 การใช้คอมพิวเตอร์ทำให้ข้าพเจ้าทำงานได้ดีขึ้น				
21 การทำงานด้วยคอมพิวเตอร์ทำให้เสียเวลามาก				
22 ความรู้ด้านคอมพิวเตอร์ไม่มีประโยชน์ต่อข้าพเจ้า				
23 คนสมัยนี้โชคดีที่มีคอมพิวเตอร์ให้ใช้				
24 ข้าพเจ้าจะศึกษาเกี่ยวกับคอมพิวเตอร์เพิ่มเติม				
25 คอมพิวเตอร์เป็นเครื่องมือที่มีราคาไม่แพงนัก คุ้มค่าที่จะซื้อมาใช้งาน				
26 ถ้าไม่มีคอมพิวเตอร์ รายงาน วิทยานิพนธ์หรือภาคนิพนธ์คงจะเสร็จยากขึ้น				
27 ข้าพเจ้าคิดว่าคนที่จะใช้คอมพิวเตอร์ได้ดีต้องเป็นคนละเอียดและรอบคอบ				

17. ความเหมาะสมของวิชาคอมพิวเตอร์เพื่อการพัฒนา (พค. 502) ในหลักสูตรของคณะ

- ☐ ควรเป็นวิชาบังคับเพราะเป็นวิชาที่มีความสำคัญที่นักศึกษาทุกคนต้องเรียนรู้
- ☐ ควรเป็นวิชาเลือกเพราะนักศึกษาทุกคนไม่จำเป็นต้องมีความรู้ด้านนี้
- ☐ หลักสูตรของคณะไม่ควรมีวิชาที่เกี่ยวกับคอมพิวเตอร์
- ☐ (ระบุ) ____

V. ปัญหาเกี่ยวกับการใช้คอมพิวเตอร์ (ถ้ายังไม่เคยนำคอมพิวเตอร์มาใช้ กรุณาข้ามไปตอบข้อ 18)

	ไม่จริงเลย	ไม่จริง	จริง	จริงที่สุด
1 ข้าพเจ้าไม่สามารถใช้คอมพิวเตอร์ในเวลาที่ต้องการใช้ได้ (เช่น เครื่องไม่ว่าง)				
2 คอมพิวเตอร์ของคณะที่มีให้นักศึกษาใช้มีน้อยเกินไป				
3 ไม่สามารถเข้าใจภาษาอังกฤษที่คอมพิวเตอร์ใช้โต้ตอบเวลาทำงาน				
4 คอมพิวเตอร์ที่ใช้มีสภาพหรือคุณภาพไม่ดี				
5 ไม่สามารถแก้ไขสถานการณ์เมื่อคอมพิวเตอร์เกิดมีปัญหาหรือมีข้อขัดข้อง				
6 ขาดความรู้ในการสั่งให้คอมพิวเตอร์ทำในสิ่งที่ต้องการ				
7 ขาดความรู้ความเข้าใจในการอ่านผล (output) ของคอมพิวเตอร์				
8 ขาดการสนับสนุนด้านการจัดหาคอมพิวเตอร์ให้ใช้				
9 ขาดการสนับสนุนด้านการให้คำปรึกษาในการใช้คอมพิวเตอร์				
10 กลัวเครื่องคอมพิวเตอร์จะพัง				
11 พิมพ์ดีดไม่คล่อง				
12 มีระเบียบปฏิบัติยุ่งยากในการขอใช้เครื่องคอมพิวเตอร์				
13 อุปกรณ์เสริมที่ใช้กับคอมพิวเตอร์ เช่น พรินเตอร์ อยู่ในสภาพที่ไม่ดี				
14 ขาดความรู้ในการใช้พรินเตอร์				
15 คำอธิบายการใช้คำสั่งต่าง ๆ ที่คอมพิวเตอร์แสดงทางหน้าจอ อ่านเข้าใจยาก				

18. ปัญหาอื่น ๆ ที่ข้าพเจ้าประสบในการใช้คอมพิวเตอร์ มีดังต่อไปนี้

1. ____
2. ____
3. ____
4. ____

VI. ข้อเสนอแนะ

19. ข้าพเจ้ามีข้อเสนอแนะต่อการใช้คอมพิวเตอร์ ดังนี้ (*ตอบได้มากกว่า 1 คำตอบ ตามความเหมาะสม*)

- ☐ จัดการแก้ไขด้านการขอใช้บริการใช้เครื่องคอมพิวเตอร์ให้สะดวกขึ้น
- ☐ จัดหาหนังสือเกี่ยวกับคอมพิวเตอร์ไว้ในห้องคอมพิวเตอร์
- ☐ จัดหาหนังสือคู่มือการใช้เครื่องพรินเตอร์ไว้ในห้องคอมพิวเตอร์
- ☐ จัดหาเจ้าหน้าที่ที่สามารถให้คำปรึกษาในการใช้เครื่องคอมพิวเตอร์ในห้องคอมพิวเตอร์
- ☐ จัดหาเครื่องคอมพิวเตอร์ให้อยู่ในสภาพหรือมีคุณภาพที่ดี
- ☐ จัดหาเครื่องคอมพิวเตอร์ที่ทันสมัยให้ใช้
- ☐ จัดหาโปรแกรมคอมพิวเตอร์ที่ทันสมัยให้ใช้
- ☐ เปิดสอนวิชาเกี่ยวกับโปรแกรมคอมพิวเตอร์ที่สำคัญหรือที่ต้องใช้บ่อย ๆ
- ☐ ควรสนับสนุนให้นักศึกษานำคอมพิวเตอร์มาใช้ในการพิมพ์รายงานด้วยตนเอง
- ☐ ควรสนับสนุนให้นักศึกษานำคอมพิวเตอร์มาใช้ในการประมวลผลทางสถิติด้วยตนเอง
- ☐ ควรสนับสนุนให้นักศึกษาวิเคราะห์ผล (output) ทางคอมพิวเตอร์ด้วยตนเอง
- ☐ (ระบุ) ____

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