This is to certify that the

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PERCEIVED MICROCOMPUTER EDUCATION NEEDS OF SELECTED INDONESIAN STUDENTS ENROLLED AT AGRICULTURALLY RELATED DEPARTMENTS IN THE UNITED STATES

By

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ABSTRACT

PERCEIVED MICROCOMPUTER EDUCATION NEEDS OF SELECTED INDONESIAN STUDENTS ENROLLED AT AGRICULTURALLY RELATED DEPARTMENTS IN THE UNITED STATES

By

Ignasius Sebayang

This study's purpose was to determine the computer education needs of selected Indonesian students enrolled at agriculturally related departments in the United States. Microcomputer experience and effective use of microcomputers prior to enrolling in these agriculturally related departments was investigated, along with an attempt to find out the perceived level of microcomputer competency needed by Indonesian students. A questionnaire was mailed to eighty students who were studying agriculturally related disciplines at thirty-five universities in twenty-six states in the United States. The questionnaire consisted of statements about computers pertaining to the categories of general, word processing, spreadsheets, databases and other.

The results showed that most of the students felt their abilities to perform particular skills were lower than their perceptions of the importance of each microcomputer skill. The skills requiring the greatest competency, which should be given the highest priority, were those associated with the general, spreadsheets and other categories.

Dedicated to:

My beloved parents.

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CHAPTER I

INTRODUCTION

Microcomputer technology is increasingly being recognized as a means to increase management efficiency and profitability on farms (McGrann and Johnson, 1988). Farmers, educators, scientists, and students have become more aware of the advantages of using microcomputers in research, extension, and other activities of agricultural disciplines (Litzenberg, 1982). With the increased emphasis on computerized decision-making, there is a need for adequate skill development to make use of these microcomputers. This situation gives rise to the opportunity for agricultural colleges to be put directly into the position of providing adequate training for agricultural students.

Indonesian graduate students who are studying agriculture in the United States need to use a variety of resources to meet their learning needs. How the students, as adult learners, perceive microcomputers is of critical importance to agricultural development in Indonesia, since an increasing number of public and private organizations are now using microcomputers there.

Statement of The Problem

The use of microcomputers in agriculture is relatively new in Indonesia, although the National Railways (PJKA), the Army, and oil companies have used a number of computers over the past 30 years. The computers were used for accounting, payroll and other administrative oriented applications. Not until the late 1970's were microcomputers used broadly in Indonesia for simple tasks (payroll, accounts, personal application,etc.) as well as to sophisticated applications (ODEDRA, 1990), in both private and public sector.

Some steps toward computer installation in the agricultural sector were initiated by the government and private industries in 1982. These steps have helped the process of computerization by making users more aware of technology, and by spreading computer literacy. Educators, researchers, administrators, students and farmers have thus become more aware of computerization in agricultural fields.

Agriculture is part of the information society from which many producers need useful information for their businesses. Farmers, researchers, students, educators, and administrators need to work together to adopt technology that will make the management of agricultural resources more efficient. With the increase of competitive markets, agricultural producers must have the best possible farming information for their businesses. Rasmussen et al. (1985) noted:

> "To remain in business, today's agricultural producer must have the best possible information on growing crops, controlling disease, and applying fertilizer, pesticides, and herbicides. In addition, the producer must keep accurate financial records for making decisions as well as for income tax purposes. The producer also must have viable marketing strategies that recognize the uncertainties of selling crops well before harvesting. To secure pertinent information, which is available and voluminous, the farmer needs microprocessor technology in order to search large data bases and select items significant to a specific operation." (p.4).

Microcomputers are important in that they assimilate vast quantities of information rapidly for the users. They also provide agricultural scientists, administrators, educators, students, and farmers with decision making data for improving the utilization of resources. Childs (1988) stated:

> "Use of computers has reduced some of the constraints of adoption to farm management techniques. Cumbersome and lengthy arithmetic can be minimized. Information can be organized and retrieved using spreadsheets or databases. Large volumes of information can be stored, searched for and located. Probability of outcomes can be included".(p.447).

Each agricultural student should have basic knowledge of computers in order to keep up with the rapid increase of agricultural technology. At present, training and education facilities have been provided to users, particularly to the students in Indonesia. However, the availability of the training centers in proportion to the population may not be enough (ODEDRA, 1990). Many students still lack experience with computers (Ellis and Odell, 1990). Since many students

and professionals from Indonesia come to agricultural colleges in the United States, it is important that these universities train Indonesian students in the use of computers and programs applicable to their work in Indonesia.

Purpose Of The Study

The purpose of this study was to determine the computer education needs of selected Indonesian students who were graduate students (1) enrolled at agriculturally related departments in the United States, and (2) sponsored by the Indonesian Government through the Midwest Universities Consortium for International Activities (MUCIA), located in Columbus, Ohio.

To accomplish the purpose of this study, the following objectives were identified:

1. To describe the demographic characteristics of Indonesian students in terms of their gender, age, status, level of education prior to study in the United States, previous computer experience, length of enrollment at agriculturally related departments in the United Sates, field of study, length of time owning a microcomputer, and highest academic degree sought.
2. To determine the importance of microcomputer

competency as perceived by Indonesian students enrolled at agriculturally related departments in the United States.

3. To identify the perceived level of microcomputer competency possessed by Indonesian students enrolled at agriculturally related departments in the United States.
4. To determine the perceived level of microcomputer competency needed by Indonesian students enrolled at agriculturally related departments in the United States.
5. To determine whether differences in educational needs exist relative to the demographic variables of gender, age, status, level of education prior to enrolling at agriculturally related departments in the United States, microcomputer ownership, length of time owning a microcomputer, working experience, degree sought, and length of enrollment in the United States.
6. To determine the relationships between the demographic characteristics of Indonesian students and their perception of computer education needs.

Significance of The Study

This study determined the microcomputer education needs of Indonesian students who were enrolled at agriculturally related departments in the United States. Microcomputer education needs were measured based upon the level of perceived competence of Indonesian students and the level of importance of each microcomputer skill. Previous research concerning the perceived level of microcomputer competency possessed by international students in the College of Agriculture and Forestry at West Virginia University indicated that most international students had no microcomputer experience prior to enrolling in the College. Half of them were beginners or non-users of microcomputers (Ellis et al. 1990).

This study examined the extent to which learning resources used by Indonesian students represented their preferred way of learning. The results of the study will help the agriculturally related departments in the United States and the Indonesian Government by identifying the appropriate training activities for Indonesian students in microcomputer use and applications in agriculture. In addition, the study will stimulate decision makers to use microcomputers in solving problems in agricultural activities.

Assumptions

For the purpose of this study the following assumptions about the students were formulated:

1. It was assumed that students learn from a variety of educational opportunities.
2. It was assumed that differences existed among Indonesian students and this was due to their demographic characteristics, such as gender, age, occupation, previous computer experience, length of study in the United States, field of study, and highest academic degree held.

Limitations

Because this study was limited to the responses collected from Indonesian students enrolled at agriculturally related departments which were supported by MUCIA in Columbus only, the findings may not be definitive of all Indonesian students in the United States.

This study was also limited to the perceptions and attitudes of eighty respondents. This factor prohibits broad generalization about microcomputing education needs of Indonesian students who are, at present studying agriculturally related disciplines.

Definition of Terms

The following are definitions used in this study for the purpose of minimizing possible misinterpretations:

Adult learner: Anyone who is involved in a deliberate effort to gain or retain a defined area of knowledge or skill or growth (Tough, 1971).

Adult education: Any purposeful effort toward self-development carried on by an individual without legal compulsion and without such efforts becoming his/her major field of activity (Knowles, 1960)

Computer: "An electronic device that manipulates symbolic information according to a list of precise instructions called a program" (Rasmussen et al. 1985, p.93).

Microcomputer: A desktop computer with a video screen and keyboard which is generally designed for home and business use (Camp et al. 1988, p.21).

Competency: A skill, attitude and judgement generally required for the successful performance of a task(s) or the sum total of attitudes, knowledge and skills which enable a person to perform efficiently and effectively a given function (Malay, 1978 in Colley, 1985).

Computer Hardware: "The physical objects that make up a computer system" (Camp et al. 1988. p.25).

Computer Software: "A program which is used on computer. A software program tells the computer what to do and how to do it" (Camp et al. 1988, p.21).

Chapter II

REVIEW OF RELATED LITERATURE

This study was an investigation of microcomputer education needs of selected Indonesian students studying agricultural related disciplines in the United States. A review of the literature referred to include books, dissertations, journals, and government reports.

The literature review is divided into four parts and begins with a look at the application of computers in developing countries. The second part of the review contains a brief overview of the application of microcomputers in agriculture. A third section describes the role of microcomputers in adult education. The fourth area covered by the review of literature summarizes the applications of computers to students of agriculture.

Computers In Developing Countries

Some considerable efforts have been made toward the application of modern information technology by some developing countries during the last ten years. As the application of computers techniques broadens, this will lead to greater efficiency and productivity of this process. The

literature on microcomputer application, as well as conferences related to microcomputers and their application in many activities in developing countries, is extensive.

References such as "Computer Applications In Food Production and Agricultural Engineering (1982)", edited by Kalman and Martinez, and "Computer Applications In Food Production and Agricultural Engineering II (1984)", edited by Balasubrahmanian, discuss computer applications in irrigation, food production, modelling and simulation, and management information systems in some developing countries.

During the first conference on Computer applications in Food Production and Agricultural Engineering at Havana, Cuba (October 1981), discussion focused on the use of information technology for better management of water resources, increasing quality and productivity in the food industry and the development of information systems in agriculture. The second conference which was held at Delhi (March 1984) was devoted to discussing applications in the fields of Food Production, Agricultural Engineering, Agricultural Meteorology, System Analysis and Management Applications.

The following literatures iterates the role of information technology in accelerating the pace of development: "Microcomputers and Their Applications For Developing Countries (1986)", "Cutting Edge Technologies and Microcomputer Applications For Developing Countries (1988)", published by Westview Special Studies in Science,

Technology, and Public Policy, "Information Technology In Developing Countries (1990)", edited by Bhatnagar and Andersen.

Information technology is important in developing countries, because information and communication management is quite complex. Problems such as the lack of a communication infrastructure, the lack of data collection or processing techniques, and the lack of funds and trained personnel, are the major obstacles that need to be hurdled by decision-makers in developing countries.

Balasubrahmanian (1984) pointed out that coordination of efforts on a number of levels in an environment of scare resources is required. With the increase of awareness of information technology, many decision-makers in developing countries are seeking reliable sources. An integrated approach involving planned use of computers in the inter-related disciplines becomes important.

Luhukay (1988) stated that information technology not only helps to make decision-making more effective, but also has a capability to assist organizations to realize previously unattainable objectives.

A report in "Microcomputers And Their Applications For Developing Countries" published in cooperation with the Board on Science and Technology for International Development (1986), indicated that microcomputers have an important role in improving the management of institutions

in developing countries. They can improve and support management performance of institutions and development projects through computer programs ranging from simple text editing to complex financial programs, which strengthen previously inadequate management practices. When executives, technicians and administrative personnel have access to information, many routine office functions become more efficient and effective.

The use of microcomputers in management is becoming increasingly important. Large amounts of data can be collected and processed for determining outlays, preparing physical targets and for monitoring the progress of various Five Year Plan projects in developing countries. Patil (1984) stated:

> "The volume of data collected is enormous and processing has to be done quickly and in sufficient detail, as to be useful for discussion in various bodies responsible for determining outlays. Because of the need for quick response and immensity of information and the variety of applications, the information system has to be computer based". (p.5).

Microcomputers are widely used in developing countries as they are inexpensive, easy to use, and becoming increasingly more capable and powerful with greater data storage capacity. Albert (1988), pointed out that these factors combined with the power of an expert system, make microcomputers one of the most useful tools ever available managing natural resources in developing countries at the national level, as well as at the local village,

association, and personal levels. Since large amounts of information about natural resources from field levels can be collected and analyzed immediately, and the results reported back to the field quickly, the local people feel that the use of microcomputers is more efficient and beneficial to them.

Kaul (1981) indicated that computer based district level information systems in developing countries would help considerably in strengthening the local administrative machinery for effective implementation of agricultural and rural development.

Furthermore, microcomputers have a number of positive results, such as local personnel becoming skilled in programming, data cleaning, editing, and analysis. As reported in "Microcomputers And Their Applications For Developing Countries", which was published by Westview Special Studies in Science, Technology, and Public Policy (1986):

> "...the use of microcomputers has had a number of positive results. First, research and evaluation skills were upgraded significantly. Second, local personnel became skilled in programming, data cleaning, editing, and analysis. Third, local data processing and analysis capacity shortened the time lapse between data collection and the generation of information needed... And finally , a totally integrated system of hardware, software, documentation, installation, and training was constructed".(p.10).

The report also discussed other advantages of using computers, such as timeliness, improved data collection and

analysis, highlighting of important information, improved presentation of cost implications, bureaucratic impact, and other social effects as well. The computer would be particularly useful where timeliness, accuracy, and complex logistics are involved. The availability of database software can make data organization and analysis more effective, and reports generated by microcomputers allow managers to focus on only the most important information.

Albert (1988) wrote of the importance of natural resources in relation to development in developing countries. He stated:

> "Of prime importance in developing countries is to determine which natural resources exist, evaluate them, and choose the most efficient way of using them. Furthermore, various natural resources are not independent of each other. Any changes introduced to one resource can have repercussions on another, and can affect the environment and the country's current and future economic well-being.
>
> As computer technology has progressed, powerful methods have been developed to analyze various specific aspects of natural resources. Models have often involved several parameters that relate to diverse conditions. With the advent and proliferation of expert system techniques and their implementation on microcomputers, powerful and relatively inexpensive methods now exist to address even more complicated models that involve many diverse data sets and conditions. The use of these new methods must be encouraged" (p.228).

The use of computers in Indonesia began in 1938 when the National Railways (PJKA) installed the first IBM punch card data processing machines (ODEDRA,1990). Then during the 1960's, oil companies and central government agencies installed three new second generation electronic computers.

These were the IBM 1401, Univac 1050, IBM S/360, IBM 1130, and IBM S/3 models. Microcomputers have been widely used since the early 1980's. Indonesia is an archipelago with 13,667 islands and a population of 182 million (Central Bureau of Statistics, 1988). Therefore, computers are seen mainly as strategic devices for improving the management performance of the public sector in Indonesia.

Computers In Agriculture

At present, the use of computers in the agricultural sector have become important. Scientists, farmers, educators, and students must have a way to manage the increasing volumes of data concerning the best uses of resources (Legacy et al. 1984). Efficient allocation of resources to each unit of agricultural production is sufficient justification for farm and agribusiness consideration of computery use. The growth of computers in farm offices, universities, and extension services has increased significantly.

Moverly (1986), recorded that computers had been applied in agriculture for more than 40 years. The earliest use of computers in agriculture was using the linear programming technique, or the application of mathematical programming to a range of business and commercial problems. He noted:

> "The earliest use of computers in agriculture was probably in the form of linear programming. This

> technique falls into a class of operational techniques known as mathematical programming and was developed in the 1940s originally for use in military operations but was quickly applied to a range of business and commercial problems. Perhaps the two earliest applications in agriculture were in farm enterprise planning and in the selection of least cost solutions, e.g. in the rationing of livestock or machinery planning".(p.20).

Moverly (1986), also noted that a variety of other methods were developed in the 1970's with the goal of overcoming some of the problems of linear programming. The use of microcomputers with farm software began in the late 1970's, and has accelerated rapidly. There is now a range of general purpose software, including word processing, spreadsheets and databases, which has use in almost any business.

Word processing software enables computers to process words efficiently by entering characters (words, numbers, spaces, and other symbols), correcting mistakes, inserting new information in the midst of previously existing material, storing the text for later retrieval and use, and printing the text in a desirable form (Sistler, 1984). Spreadsheets are used to help agricultural producers prepare cost of production budgets for use in the daily operation of their business. Spreadsheets can improve management productivity and decision making efficiency because of their analytical decision-making power, adaptability to a broad range of management uses, and high level of productivity (Schmisseur and Landis, 1985).

Database software is important to agricultural management for handling large volumes of data quickly and easily. Legacy et al. (1984) stated:

> "As farmers are required to make decisions on units within enterprises, the microprocessor's assets of speed and accuracy become important. Example of this ability include the microprocessing ability to keep record for individual units of farm and ranch production. As detailed individual production information is provided, the microprocessor will store and analyze this information in accordance with previously programmed instructions". (p.16).

Kalman and Martinez (1982) summarized the recommendations made during the first conference on "Computer Applications in Food Production and Agricultural Engineering" at Havana (October 1981). The authors in articles stated that computers can considerably increase the efficiency of irrigation, and the quality and productivity of the food industry, as well as help determine appropriate agricultural policies. The article also highlighted that investments in hardware, software, and training personnel, are important for agricultural development in developing countries.

According to Balasubrahmanian (1984), the focus of the second conference, which was held in Delhi (March 1984), was not only to reiterate conclusions of the first conference, but also to focus more detail on some of the technological tools that have become available in developing countries. The role of microcomputer technology in supporting information systems in agricultural industries and

cooperative organizations was also described. The experiences that some developing countries have had with microcomputer applications in the field of agriculture were deliberately discussed.

At this conference, Biro and Dienes discussed the application of computers in the management information system of the Hungarian Food Research and Industry. Patil discussed the use of information technology in the inter-related disciplines of agricultural research, agricultural economics, agricultural information, Gene data bank, agricultural planning, and agrometeorology in India. The application of computers in food production and distribution in developing countries was also mentioned by other participants.

Schware (1984) brought up the issue about prospects and problems of microcomputer technology as a tool for farm management for developing countries, and Robson (1984) spoke on the issue of computer communication and information transfer in agricultural extension.

It was recognized that the integrated approach involving planned use of microcomputers in the agricultural fields can increase the quality and effectiveness of agricultural information systems. A summary of the recommendations made during the conference are documented by Balasubrahmanian (1984) and are as follows:

1. The application of computers is relevant to

agricultural fields in developing countries.

2. There is a need for the integrated approach involving planned use of computers in the inter-related disciplines of agricultural disciplines.
3. The computer would be useful where timeliness, accuracy, and complex logistics are involved.
4. Microcomputers and direct data capturing devices that are available at low prices today can be used with advantage.
5. Microcomputers would enhance information system and support reasonably sized data bases to function as expert systems for providing advice to farmers and the local area levels. The concept of using such microcomputers as part of an agricultural program was considered a very urgent and feasible approach.
6. The role of computers in cash crop production should be enlarged. It was revealed that the modelling approach to finding solutions in many complex phases of agriculture would help to improve production.
7. Yield forecast models with more explanatory parameters are feasible today and should be exploited for long term forecasting and planning of food production and buffer stocks.
8. The conference noted the relatively increasing cost of software as compared to hardware. Thus, it is important that flexible and efficient software be developed. The

difficulties experienced in using some of the general data management software packages for applications in the agricultural area would call for a more critical evaluation and development of data base management software more suited for agricultural information.

9. A microprocessor based communication network can improve the agro-meteorological service for farmers based on previous, present, and anticipated weather conditions.
10. Advisory centers could be established at district levels. In the initial stage, they could start at the level of a Division, be extended to smaller regions and ultimately, to farm cooperatives.
11. Training programs for Extension Workers and Users could be organized through Advisory centers.
12. It is necessary to devise management practices, and marketing, storage, and transportation systems with the aid of computer based information systems, so that agricultural technology can reach the farmers.

Developments in computer technology have made it possible to acquire personal computers at low cost. Microcomputers are now common in the schools, at home, at work, and as a consequence, have become readily available to the agricultural industry (Moverly, 1986). Users would now have access to a range of general purpose software programs for processing and analysis of agricultural information.

Microcomputer And Adult Education

According to Howie (1989) microcomputers can be used to build knowledge and experience. Building knowledge can increase learners' understanding of the subject matter. He pointed out:

> "Computer programs may be used to build students'background experience, establish purposes, and develop their thinking skills through different cognitive models. In particular, the computer offers problem-solving opportunities for students to develop skills they can use in processes that require clear, logical thinking" (p.34).

Dede (1987), indicated that the potential of the microcomputer for developing thinking skills has evolved through "cognition enhancers", such as empowering environments, hypermedia, and microworlds. The concept of cognition enhancers is that of using the complementary cognitive strengths of human beings and information technology in partnership. Microcomputer will become more important as more people find that microcomputers are superior in problem solving.

Apps, in Gueulette (1982), showed that microcomputers are an appropriate source of information for adults since they can be used to provide simulations that offer adult learners opportunities to practice tasks more inexpensively. The greatest potential use of microcomputer software programs for adult education is in the area of problem solving. It is possible that the microcomputer will have implications in adult education programs.

Meierhenry (1982) concluded that the accessibility of schools, colleges, and universities for microcomputer installation will be a positive factor in the future use of computers in adult learning. He noted:

> "The potential for the use of microcomputers in relation to the locale of adult education activities would be very high since schools, colleges, and universities are likely to have microcomputers and appropriate settings in which they could be used. A community center might include a resource center with microcomputers; this would be a favorable place to conduct adult education classes requiring the microcomputers. Work places that are not currently making wide use of microcomputers for training certainly have the potential to do so. The home is another place for an increasing number of microcomputers in the future. Thus, the accessibility of locations for microcomputer installations is a very positive factor in their future widespread use". (p.20).

Gerver (1984) explained some other important reasons for educational use of microcomputers in adult learning. These include:

1. The increased awareness of microcomputer application in adult learning.
2. The increased demand for learning about computers.
3. The need to help adults deal with computers in order for them to be more equal with children in terms of computer literacy, as children have been involved with using microcomputers extensively.
4. Computers have been used to support adult learning in a number of significant areas.

5. Some sceptism about the advantages of using computers in adult learning causes further examination of computer usage in adult education.

With this background, graduate students as adult learners can engage their related life experiences with new subject matter. With the use of microcomputers, they can obtain a richer variety of experiences that are highly motivational. This kind of critical thinking experience builds student interest while providing a realistic learning experience. This activity also encourages cooperative learning, as it truly integrates not only the idea of subject matter, but also the process of building knowledge and experience.

Microcomputer Application To Students of Agriculture

According to Litzenberg (1982), the application of computer technology in agricultural classrooms in the United States has occurred for more than fifteen years. It is only logical that students and faculty accept the computer technology and take full advantage of its benefits.

Litzenberg also found that the increase in microcomputer awareness and interest in the agriculture classroom was based on the following reasons:

1. The decrease in cost of hardware and software.
2. The growing demand for using computers in agricultural research, extension, and teaching

activities.

3. The growth in farming use of microcomputers needs awareness and response from agricultural colleges.
4. Capability of computer technology both in hardware and software is increasing.
5. Microcomputers have become easier to use by the agricultural producers, decision-makers, students, educators, and scientists.

Litzenberg (1982) also clarified that the application of microcomputers in agricultural classrooms not only meets the need for computer skills on the job, but also increases student motivation and participation in learning activities. He noted:

> "A major potential of using small business computers in the classroom, in addition to the expressed need in the market place for our graduates, is the enhancement of teaching activities themselves. Micro- and minicomputers have capabilities to expand the range of abilities of students serviced more than any teaching aid ever developed. As a remedial tool, the small computer can allow a slower student to go over a topic more times or more slowly than conventional classroom methods". (p.974).

Farmers, educators, scientists, and students become more aware of the advantages of microcomputers in the areas of research, extension, and other activities of virtually all agricultural disciplines. As with the increased emphasis on computerized decision making, there is a need for adequate skills to use the microcomputer. This situation

brings to light the opportunity for agricultural colleges to be put directly into position to provide adequate training for agricultural students.

Ellis et al. (1990), in a study of 66 international students at the College of Agriculture and Forestry at West Virginia University, found that only 40% had previous computer experience. This figure indicates that the majority of international students had no previous microcomputer experience, though they had completed a baccalaureate degree in their countries.

Indonesian graduate students who are studying agriculture in the United States need to use a variety of resources to meet their learning needs. How the students, as adult learners, perceive microcomputers is of critical importance to agricultural development in Indonesia, since an increasing number of public and private organizations use microcomputers there.

Summary

Microcomputers are definitely agricultural components and, in the future, will impact almost all aspects of agricultural activities. Scientists, educators, students, and farmers in developing countries will need to realize that microcomputers are important in their daily activities.

Microcomputers are useful in managing natural resources in developing countries at the national level as well as at

the local village, association, and personal levels. Since large amounts of information about natural resources from field levels can be collected and analyzed immediately, people feel that the use of microcomputer is more efficient and beneficial to them.

Microcomputers have and will continue to have an impact on agricultural activities. With the increased emphasis on computerized decision-making, there is a need for adequate skills to use the microcomputers. This situation does put agricultural colleges directly into a position to provide adequate training for agricultural students.

This research will determine the computer education needs of selected Indonesian students enrolled at agriculturally related departments in the United States. A conceptual framework and an operational model of this study are depicted in figures 1 and 2.

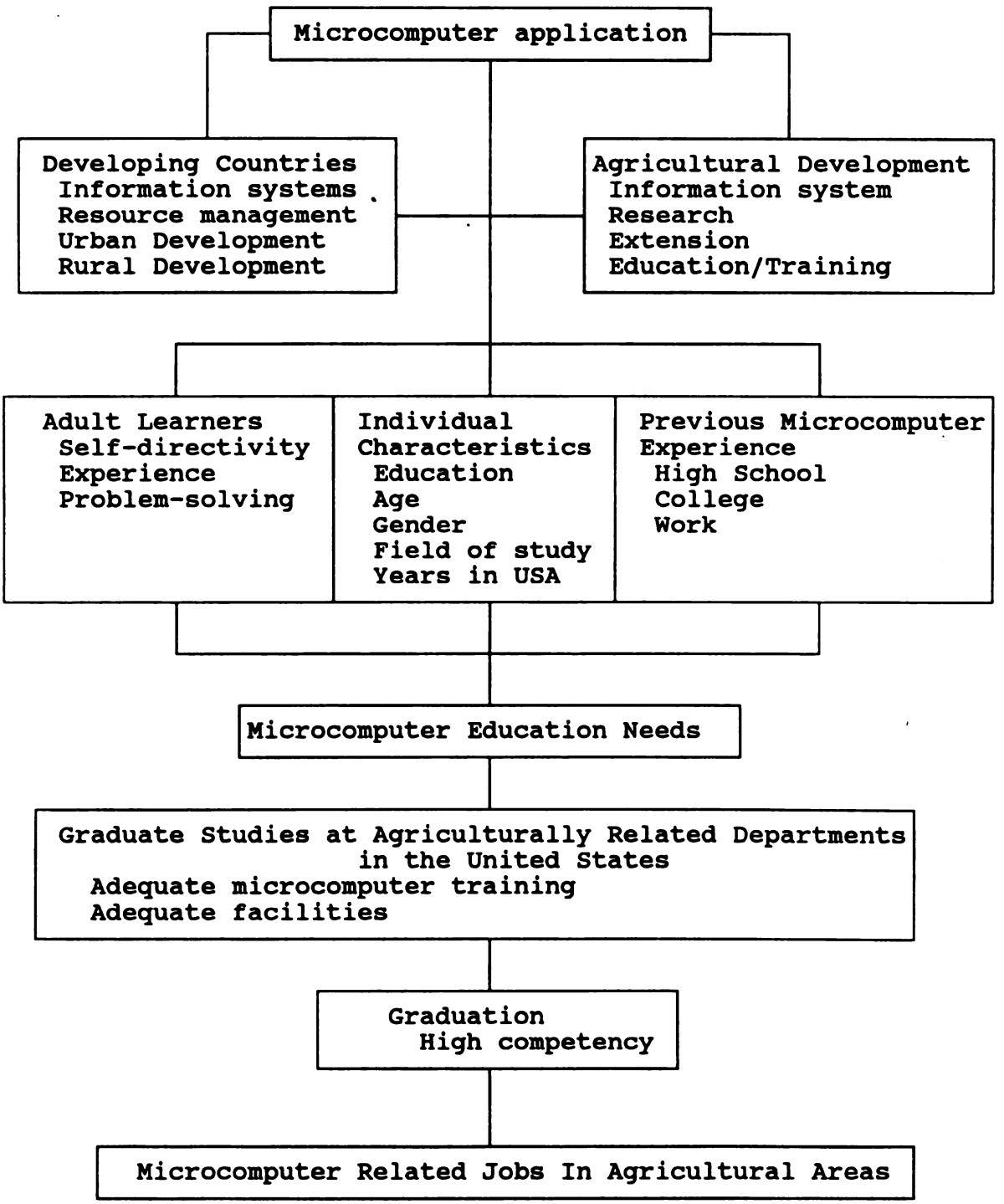

Figure 1. Conceptual framework of the study

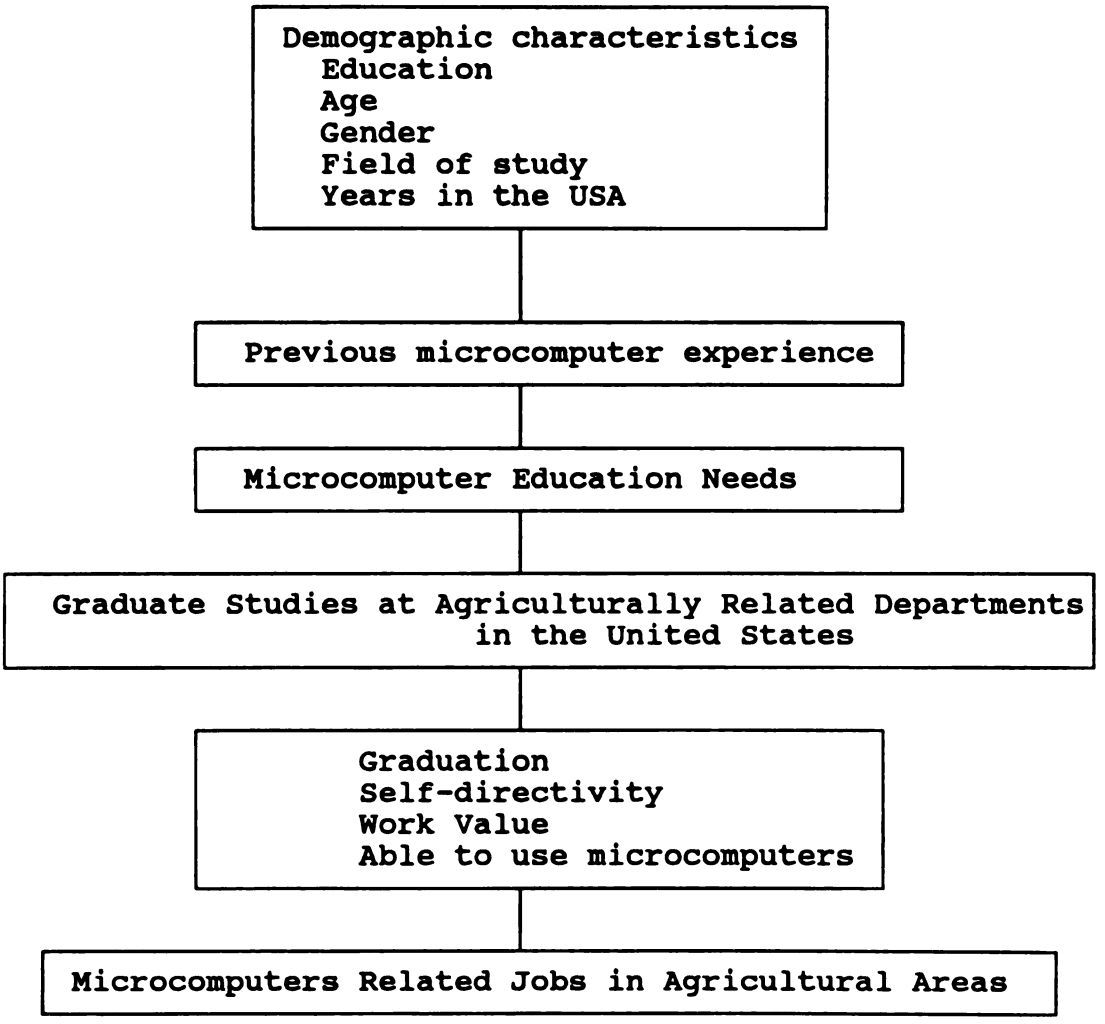

Figure 2. Operational framework of the study

CHAPTER III

METHODOLOGY

The purpose of the study was to determine the computer education needs of selected Indonesian students who were graduate students (1) enrolled at agriculturally related departments in the United States, and (2) sponsored by the Indonesian Government through the Midwest Universities Consortium for International Activities (MUCIA) located in Columbus, Ohio. This chapter reports the methodologies that were used for the study.

Population

The study was descriptive in nature. Information was sought from selected Indonesian students enrolled at agriculturally related departments in the United States. A list of participants was gathered with the assistance of the Indonesian Overseas Training Support Office in Columbus. The subjects of the study were eighty graduate students who were studying agriculturally related disciplines at thirty-five universities in twenty-six states in the United States during summer of 1991. Table 1 describes the universities and number of participants in the study.

Table 1. Universities and number of subjects in the study

Universities	# of subjects	Universities	# of subjects
Auburn University	12	University of Arizona	1
University of Arkansas	1	Northern Arizona University	1
Loma Linda Univ.	2	Colorado State	4
Univ. of Florida	1	Florida Institute of Technology	1
Univ. of Hawai	5	Univ. of Georgia	1
Southern Illinois	1	Univ. of Illinois	5
Iowa State	1	Ball State	1
Univ. of Maine	1	Mississippi State	5
Michigan State	6	SUNY/Syracuse	1
Univ. of Ohio	1	North Dakota State	2
Ohio State	1	Cincinnati	1
Penn State	1	Oregon State	7
University of Rhode Island	3	University of South Carolina	1
Clemson University	1	College of Charleston	1
West Texas State	1	Virginia Commonwealth	1
Texas A & M University	2	University of Tennessee	1
University of Washington	2	Wisconsin/ Steven Pt	1
Univeristy of Wisconsin	2	Wisconsin/ Green Bay	1
Total	44	Total	36
Grand Total	80		

Development Of The Instrument

The data collection instrument was adapted from previously validated instruments. The instrument had been administered at East Texas State University by Rogers (1987) and at West Virginia University by Ellis et al. (1990). The validity of the instrument at East Texas State University was reviewed and verified by a panel of selected faculty members and graduate students from the departments of Educational Technology, Computer Science, Management, and Vocational Education (Rogers, 1987). A panel of experts consisting of faculty members from the College of Agriculture and Forestry reviewed and verified the validity of the instrument at West Virginia University (Ellis et al. 1990). The Cronbach's Alpha for both the importance and ability sections of the questionnaire at West Virginia University was 0.95 (Ellis et al. 1990).

The instrument was comprised of two parts. Part One of the questionnaire consisted of forty-three statements. Twelve of these statements pertained to the category of general information, eleven to the category of word processing, seven to spreadsheets, five to databases, and eight to the category of other.

Part One of the questionnaire utilized a Likert-type scale to measure the importance level for each microcomputer skill. A Likert-type scale was also used to measure the level of perceived competence of Indonesian students. There

were four levels on the rating scale for the importance level of each microcomputer skill: (1) not important, (2) slightly important, (3) important, and (4) very important. The following rating scales are for levels of perceived competence: (1) no ability, (2) low ability (low level of competence), (3) moderate ability (moderate level of competence), and (4) high ability (high level of competence).

A Needs Assessment Model developed by Borich (1980) was used to determine the competency needs of the respondents. Each competency need was the difference between perceived importance and perceived level of attainment. Competency needs or "knowledge discrepancy" was ordered according to magnitude or relative weight, calculated by multiplying the average score of perceived importance of all respondents by the discrepancy score. Knowledge discrepancy was defined by Sherman (1986), in Ellis et al.(1990), as Borich's Priority Needs Index (PNI).

Borich's Priority Needs Index [PNI = (I-A x $\overline{I}$] was used to analyze the Indonesian students' microcomputing education needs. The perceived importance score (I) for each item was defined as the Indonesian students'perceptions of the importance of each microcomputer skill. The knowledge competence score (A) was defined as the Indonesian students' ability to perform microcomputing skills personally.

Part Two of the questionnaire pertained to the

demographic characteristics of the Indonesian students. The characteristics were: age, gender, length of working experience prior to studying in the United States, previous computer experience, length of enrollment at a university, major field of study, and highest degree held.

A panel of experts from Michigan State University's Department of Agricultural and Extension Education examined the adapted instrument to ascertain its content validity. The instrument was pilot tested with a group of sixteen Indonesian students enrolled at Michigan State University in order to determine its reliability. A Cronbach's alpha procedure was used to determine the internal consistency among the competency statements of the questionnaire. The Cronbach's alpha estimates for all categories and subcategories of competency statements were within the range of .77 to .98.

Data Gathering Procedures and Analysis

Descriptive survey research, in the form of a census was used to obtain data for this study. The mailing procedures for the collection of data followed the recommendations made by Dillman (1990). The questionnaire, along with a cover letter, was sent to eighty Indonesian students enrolled at agriculturally related departments at thirty-five universities in the United States on July 1, 1991. A postcard follow-up was sent to the subjects of the

study one week after the questionnaire was mailed. A second questionnaire was mailed to the non-respondents two weeks after the postcards were sent out. Copies of all materials used in the mailing packets, the postcard and the follow-up letter are provided in Appendix A. Non-respondents were categorized as late respondents (Miller and Smith, 1983) and compared to early respondents using the t-test. No differences at the .05 level were found between the two groups which allowed for the generalization of the results of the survey population.

Objective One

Demographic data were tabulated and analyzed in terms of frequencies and percentages of participants by age, gender, previous microcomputer experience, working experience, microcomputer ownership, length of computer ownership, length of enrollment at a university, major field of study, and highest degree held.

Objective Two

The importance of microcomputer competency as perceived by Indonesian students was tabulated and analyzed using the means and standard deviations.

Objective Three

The competency level possessed by Indonesian students was tabulated and analyzed using the means and standard deviations.

Objective Four

The extent of competency needed by Indonesian students was measured based on the levels of perceived competence and importance for each microcomputer skill. Competency needs or "knowledge discrepancy" was ordered according to magnitude or relative weight, calculated by multiplying the average score of perceived importance of all respondents by the discrepancy score. Knowledge discrepancy was defined by Sherman (1986), in Ellis et al. (1990), as Borich's Priority Needs Index (PNI). The formula used for the calculation is as follows:

$PNI = (I - A) \times \bar{I}$ whereas

I= perceived importance score of each skill pertaining to the categories of general, word processing, spreadsheets, databases, and others

A= perceived ability score of each skill pertaining to the categories of general, word processing,spreadsheets, databases, and others

$\bar{I}$= average score of perceived importance of all participants.

The data were tabulated by using the means and standard deviations.

Objective Five

T-tests were performed to see if Indonesian students who enrolled at agriculturally related departments in the United States differed in their perceptions to microcomputer education needs as related to gender, age, status, level of education, microcomputer ownership, microcomputer experience, and degree sought. One-way analysis of variance and B-Tukey procedures were used to examine differences in microcomputer educational needs in terms of years of working experience prior to coming to the United States, length of enrollment in an agriculturally related department in the United States, and field of study.

Objective Six

Cramer's V correlation coefficients were computed to determine the relationships between status, education, degree sought, microcomputer ownership, and the students' perceptions of computer education needs. On the other hand, Pearson correlation coefficients were used to analyze the relationships between the students' demographic characteristics of age, working experience, microcomputer experience, length of enrollment in agriculturally related departments in the United States, and students' perceptions of computer education needs.

The data were analyzed by means of the Statistical Package for the Social Sciences (SPSS/PC+).

CHAPTER IV

FINDINGS

This chapter contains data concerning the perceptions and attitudes of Indonesian graduate students toward microcomputer education needs. These Indonesian students were graduate students (1) enrolled at agriculturally related departments in the United States, (2) sponsored by the Indonesian Government through (MUCIA) in Columbus, Ohio. Data analysis related to the purpose of the study are included in this chapter, and presented through a mixture of statistical tables, pie/bar charts and explanatory text.

Instrument Reliability

In Chapter III the procedure for testing the internal consistency of the survey instrument was briefly explained. As was reported in Chapter III, a Cronbach's alpha procedure was used to determine the internal consistency among the competency statements of the questionnaire. The lowest reliability coefficient was .77 and the highest was .98 (Appendix B). The coefficients indicated that the instrument's scales were acceptable (Ary et al. 1990).

Pattern of Response

Eighty questionnaires were mailed to the subjects of the study. From this target population, it was learned that four students had since returned to Indonesia, resulting in an accessible population of seventy-six. Of these, sixty-three usable responses were obtained. Table 2 presents data about the universities and percentages of students surveyed who responded.

Table 2. Number of respondents from each university

Universities	No.of students surveyed	Responses No.	%
Auburn University	12	11	91.66
University of Arizona	1	1	100.00
University of Arkansas	1	-	-
Northern Arizona University	1	1	100.00
Loma Linda University	2	1	50.00
Colorado State	4	3	75.00
University of Wisconsin	2	1	50.00
Florida Inst.of Technology	1	-	-
University of Hawai	5	3	60.00
University of Georgia	1	1	100.00
Southern Illinois	1	1	100.00
University of Illinois	5	5	100.00
Iowa State	1	-	-
Ball State	1	1	100.00
University of Maine	1	1	100.00
Mississippi State	5	5	100.00
Michigan State	6	6	100.00

Table 2. Contd...

Universities	No.of students surveyed	Responses No.	%
SUNY/Syracuse	1	-	-
University of Ohio	1	1	100.00
North Dakota State	1	1	100.00
Ohio State	1	1	100.00
Cincinnati	1	1	100.00
Penn Statex	1	1	100.00
Wisconsin/ Green Bay	1	1	100.00
U.of Rhode Island	3	2	66.67
U.of Washington	2	2	100.00
Clemson University	1	-	-
College of Charleston	1	1	100.00
West Texas State	1	1	100.00
Virginia Commonwealth	1	1	100.00
Texas A & M	2	2	100.00
University of Tennessee	1	1	100.00
Oregon State	7	6	85.71
Total	76	63	82.89

Sixty-three Indonesian graduate students who were studying agriculturally related disciplines at twenty-seven universities from twenty-four states in the Unites States responded for a total respondent rate of 83 percent. Respondents completed questionnaires which were used to gather information about their perceptions about microcomputer education needs and demographic information.

All respondents listed their age, gender, status, level of education prior to study in the USA, field of study, work experience, previous computer experience, and length of study in the USA. Appendix A presents the complete questionnaire used by the researcher.

The questionnaire was sent to the study participants on July 1, 1991. Thirty-nine returned their completed questionnaires prior to July 15, 1991 and twenty-four students responded after July 15,1991. A postcard follow-up was sent one week after the questionnaire was mailed, and then the second round of letters and questionnaires were mailed to the non-respondents three weeks after the first questionnaires were sent.

Non-respondents were similar to late respondents (Miller & Smith, 1983). Characteristics of the late respondents were compared to early respondents by using a t-test analysis. The results in Appendix C show that characteristics (age, gender, education, field of study, and degree sought) between early and late respondents are not significantly different ($p < .05$). Therefore, both early respondents and late respondents are assumed to be representative of the population.

Objective One

Demographic characteristics, including gender, age, status, level of education prior to study in the USA, and

number of children at home were obtained from each study participant. Some additional background information was gathered regarding their previous computer experience, length of enrollment at agriculturally related departments in the United States, major field of study, length of computer ownership, and degree pursued.

Table 3 presents information about the respondents' gender, age, level of education prior to study in the USA, and status. In this study there were fifteen females and forty-eight males. Their ages ranged from twenty-seven to fifty years old.

Table 3. Gender, age, level of education, and status

Characteristics	Number	Percent
Gender		
Female	15	23.8
Male	48	76.2
Age		
27 through 35	37	58.7
36 through 45	23	36.5
> 45	3	4.8
Education		
BS	53	84.1
MS	10	15.9
Status		
Never Married	8	12.7
Married	55	87.3

Thirty-seven participants indicated they were between 27 and 35 years old; twenty-three were 36 to 45 years old, and three were over 45 years old.

All respondents had at least a baccalaureate degree prior to coming to the United States. Fifty-three (84 percent) had completed bachelor's degrees and ten students (16 percent) had completed master's degrees. Table 4 shows the distribution of disciplines studied, indicating that most respondents had previous degrees in agriculturally related areas; only three respondents had degrees unrelated to agriculture. Specifically, these degrees were in communication, geology and metallurgy.

In this study, 13 percent of the respondents were never married; 87 percent (55 respondents) were married. Figure 3 shows a complete breakdown of the number of children born to the 55 married participants. As can be seen, seven percent participants had no children, 31 percent had one child, 44 percent had two children, 13 percent had three children, and five percent participants had four children.

Table 4. Distribution of disciplines prior to enrollment in agriculturally related departments in the USA

Discipline	Number of students	Percent
Agric.Economics	4	6.3
Agric.Education	1	1.6
Agric.Engineering	4	6.3
Agronomy	8	12.7
Animal Science	2	3.2
Biology	1	1.6
Chemistry	2	3.2
Communication	1	1.6
DVM	1	1.6
Entomology	6	9.5
Fisheries	9	14.3
Food Science	6	9.5
Forestry	11	17.5
Geology	1	1.6
Metallurgy	1	1.6
Pharmacy	1	1.6
Soil Science	3	4.8
Statistics	1	1.6
Total	63	100

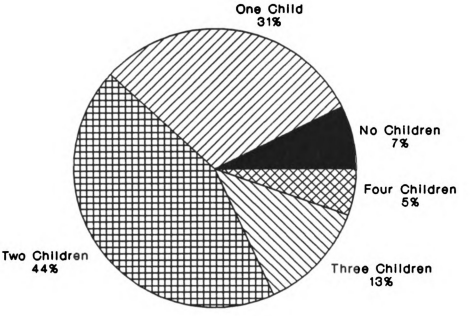

Figure 3. Number of children of married respondents [n=55]

Table 5 shows the number of students using microcomputers in their study, the level of their education when they first learned to use microcomputers, and the number of students who used microcomputers at their jobs in Indonesia. It is interesting to note that, even though all Indonesian students had completed at least a bachelor's degree before coming to the United States, only 25 percent had used microcomputers in their study in Indonesia. Most of the study participants learned how to use microcomputers during their work experiences, therefore, the number of students using microcomputers while at their work was relatively high.

Table 5. Microcomputer users during studying and working in Indonesia

Characteristics	Number	Percent
Used microcomputers while studying in Indonesia		
No	47	75
Yes	16	25
Level of education when they first learned how to use microcomputers		
Elementary School	-	-
Junior High School	-	-
High School	-	-
College	16	25
Used microcomputers while working in Indonesia		
No	22	35
Yes	41	65

Figures 4 and 5 show the length of working experience and the length of microcomputer experience of the study participants before coming to the United States, respectively. As can be seen, most students had worked more than five years prior to coming to the United States. Only fifteen participants (24 percent) had less than five years of work experience. It is interesting to note that, even though most Indonesian students had used microcomputers while at work, only a few had more than five years of experience with them; in most cases, their experience with microcomputers ranged from one to five years.

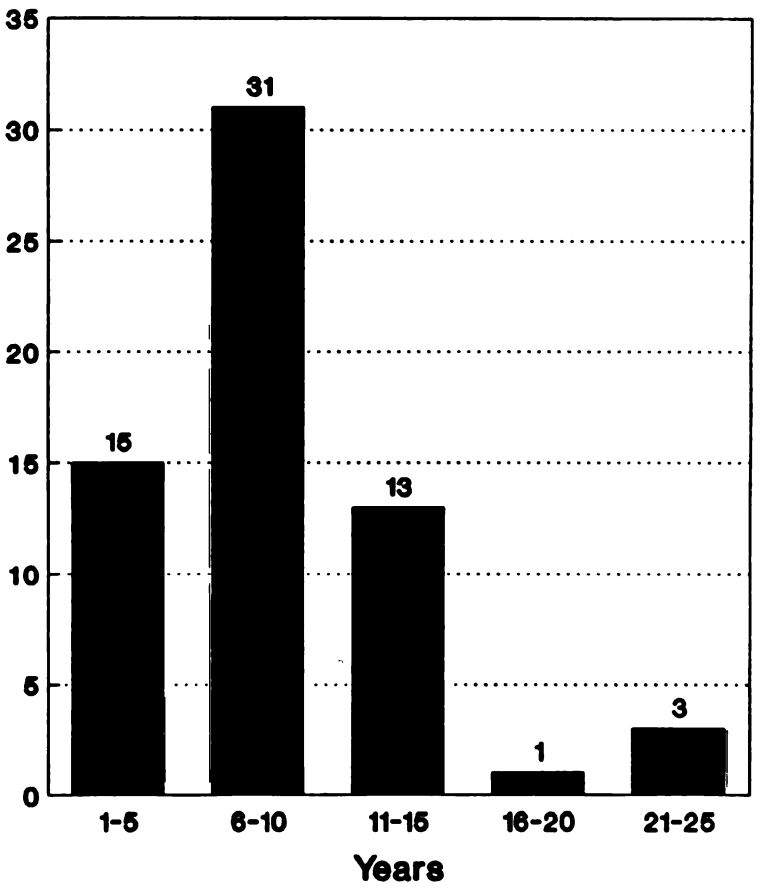

Figure 4. Working experience prior to entering the USA

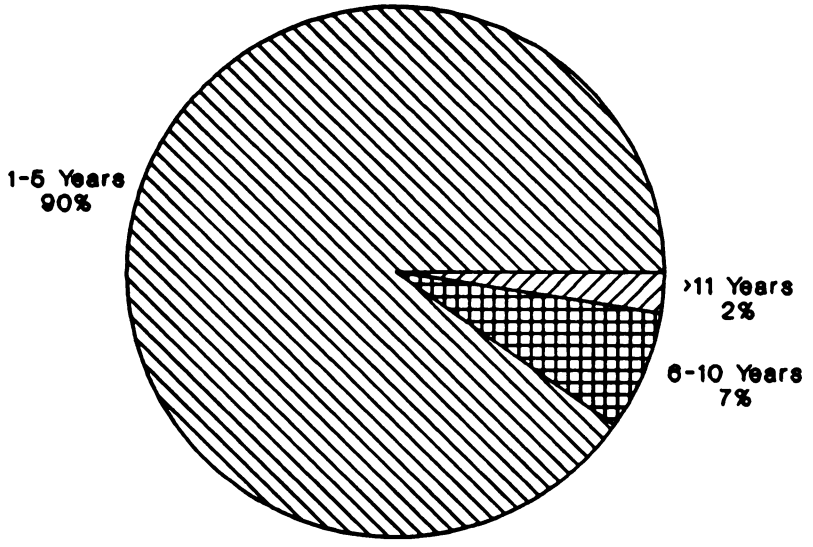

Figure 5. Length of participants' experience with microcomputers while working in Indonesia

While more than seventy-five percent of the Indonesian students had worked more than five years prior to enrolling at an agriculturally related department in the United States, less than ten percent of the students had more than five years experience with microcomputers: for most of the respondents, working with microcomputers was a relatively new experience. Table 6 shows a cross-tabulation of the working experience and microcomputer experience of the users.

Table 6. Length of working experience and microcomputer experience of the students prior to coming to the USA

	Microcomputer experience (Years)		
	1-5	6-10	>11
Working experience 1 - 5 Years	5	2	-
Working experience 6 -10 Years	19	1	-
Working experience > 11 Years	13	-	1
Total	37	3	1

The applications of microcomputer software by Indonesian students are shown in Table 7. The popularity of word processing is self-evident among the respondents. All microcomputer users had used at least one word processing application program. Of forty-one respondents who had used a microcomputer at work in Indonesia, 24 percent had

experience only with word processing programs, 34 percent had experience with both word processing and spreadsheet programs, five percent had both word processing and database experience, 15 percent had word processing, spreadsheet and database experience, and less than 10 percent had experience with word processing and other combinations of application programs. The application of statistics and programming language combined with either word processing, or spreadsheet and database programs, are also shown in Table 7. Three participants, or less than 5 percent, had used word processing and statistics programs while working in Indonesia; two students had experience with word processing, spreadsheets, and statistics; and only one participant had the capability to work with word processing, spreadsheet, database, and statistical programs. The number of Indonesian students who had used programming language while working in Indonesia is less than 8 percent; about five percent had experience with word processing, and less than three percent had experience with word processing, spreadsheets, and databases. None of the respondents had experience with both statistics and programming language while working in Indonesia.

Table 7. Application of microcomputers by Indonesian students prior to coming to the USA

Application	Number	Percentage
Word processing	10	24.4
Word processing and Spreadsheets	14	34.1
Word processing and Databases	2	4.9
Word processing, Spreadsheets, Databases	6	14.6
Word processing and Statistics	3	7.3
Word processing, Spreadsheets, Statistics	2	4.9
Word processing and Programming	2	4.9
Word processing, Spreadsheets, Databases, and Statistics	1	2.4
Word processing, Spreadsheets, Databases, Programming	1	2.4
Total	41	100.0

In addition to questions relating to working experience and microcomputer experience prior to enrollment at agriculturally related departments in the United States, participants were asked their field and length of study in the United States. Table 8 shows the distribution of the disciplines of the respondents, indicating all the study participants enrolled at agriculturally related departments in the United States. The study participants' fields of study varied according to their interests. The number of study participants enrolled in each field ranged from one in Horticulture to 13 participants in Agricultural Economics.

Three participants indicated that they enrolled in Agricultural and Extension Education; two in each of Agriculture Engineering, Animal Science, and Biology; four in each of Environmental Science, Resource Economics, Crop and Soil Science, and Food Science; six in Entomology; seven in Fisheries; and 11 participants enrolled in Forestry. It is interesting to note that 17 participants enrolled in Agricultural Economics and Resource Economics, even though only four of them had previous degrees related to economics prior to coming to the United States.

Table 8. Distribution of disciplines and number of Indonesian students at agriculturally related departments in the United States

Discipline	Number	Percent
Agric.Economics	13	20.6
Agric.Extension & Education	3	4.8
Agric.Engineering	2	3.2
Horticulture	1	1.6
Animal Science	2	3.2
Biology	3	3.2
Environmental Science	4	6.3
Resource Economics	4	6.3
Crop and Soil Science	4	6.3
Entomology	6	9.5
Fisheries	7	11.5
Food Science	4	6.3
Forestry	11	17.5
Total	63	100.0

Figure 6 shows the duration of study of the respondents. There was variation in the amount of time that the study participants stayed in the United States. However, most of the study participants indicated that they had stayed in the United States between 13 and 24 months. Seventeen participants stayed between one and 12 months; eight participants stayed 25 to 36 months; three stayed 37 to 48 months; and less than two percent stayed more than 48 months.

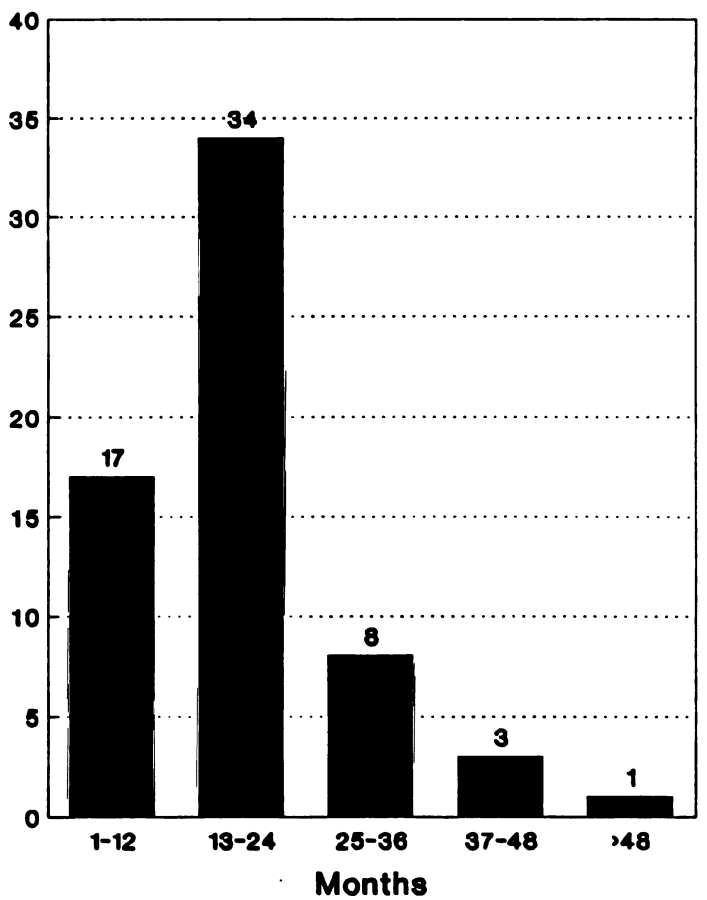

Figure 6. Duration of studies in the USA

The researcher also asked questions about the degrees they were pursuing, microcomputer ownership, their ability to use microcomputers, and barriers that kept them from learning more about microcomputers while studying in the United States. One more question asked the study participants to indicate whether they will have access to microcomputers when they return to Indonesia. Table 9 represents this information.

Table 9. Degree, microcomputer ownership, ability, barrier, and access

Characteristics	Number	Percent
Degree pursued		
Masters	47	75
PhD	16	25
Microcomputer ownership		
No	32	51
Yes	31	49
Barriers that kept students from learning more about microcomputers		
No	20	32
Yes	43	68
Access to microcomputers upon return to Indonesia		
No	9	14
Yes	54	86

Seventy-five percent (47) of the participants were pursuing masters degrees and 25 percent (16) were pursuing PhD degrees.

About half (49 percent) of the study participants indicated that they owned microcomputers while studying in the United States; 51 percent of the students did not have a microcomputer. When asked about the length of time of microcomputer ownership, there were variations in the duration of time among the 31 participants who owned microcomputers. A great amount of the 31 study participants (58 percent) owned microcomputers for less than 13 months; 10 percent owned microcomputers between 13 and 24 months; six percent owned them for more than 24 months, but less than 37 months; 16 percent owned microcomputers between 37 and 48 months; and about 10 percent owned microcomputers for more than 48 months. Table 10 shows a cross-tabulation of computer ownership by the study participants and the degrees they were pursuing. Figure 7 summarizes the months of ownership of microcomputers by the 31 study participants.

Table 10. Degrees and microcomputer ownership

Degrees pursued	Microcomputer ownership	
	No (n=32)	Yes (n=31)
Masters	26	21
PhD	6	10

The level of ability of the 31 Indonesian students enrolled at agriculturally related departments who owned microcomputers is depicted in Figure 8. Nineteen percent of the study participants who owned microcomputers indicated that their level of ability was low, 71 percent rated their ability as moderate, and less than 10 percent of the respondents who had microcomputers viewed their level of ability as high.

Sixty-eight percent (43) of the study participants indicated that barriers that kept them from learning more about microcomputers. Twenty-four students viewed the lack of time as the main barrier; 10 students indicated lack of facilities, and only one student indicated that lack of interest kept him from learning more about microcomputers. Other students viewed combinations of the lack of time with either lack of interest or lack of facilities as factors which kept them from learning more about microcomputers. One student indicated lack of time and interest as obstacles; three viewed lack of time and facilities as obstacles; one indicated lack of time, interest, and facilities as barriers. Three participants categorized barriers as "other", including lack of a tutor and limited interest. One student indicated that the lack of a tutor was the main barrier; and two other participants viewed the lack of time and the lack of a tuto, as well as limited interest, as their common barriers which kept them from learning about

microcomputers. Figure 9 summarizes the barriers which kept the study participants from learning more about microcomputers.

A great majority of the study participants indicated that they will have access to microcomputers when they return to Indonesia. Table 9 shows that about 86 percent of the respondents answered "Yes" when asked about their access to microcomputers. Only 14 percent indicated that they will not have access to microcomputers when they return to Indonesia.

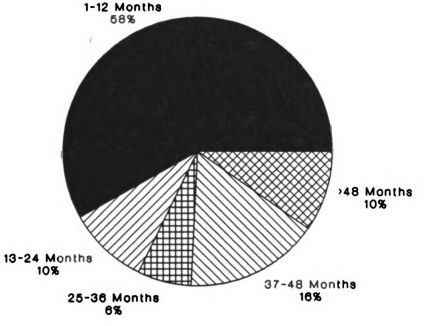

Figure 7. Length of time of microcomputer ownership (n=31)

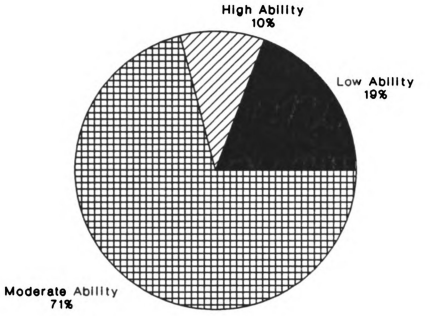

Figure 8. Perceived microcomputer ability (n=31)

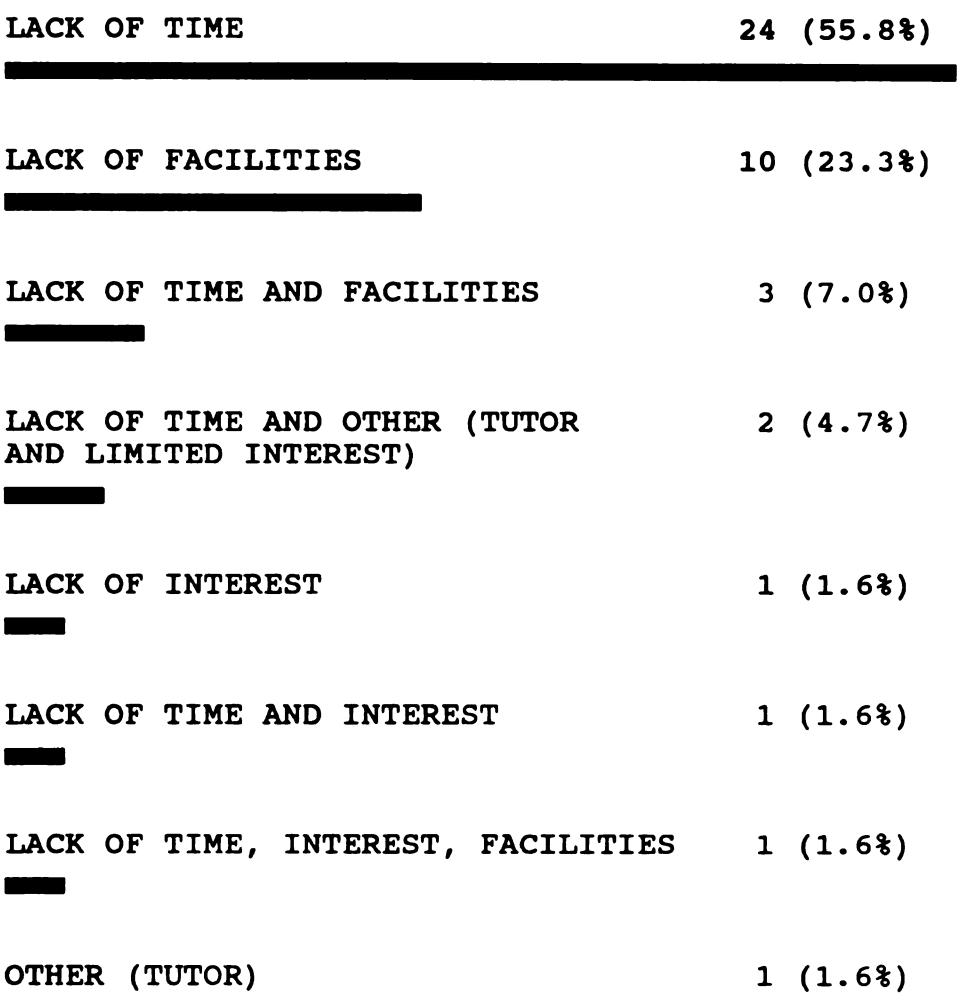

Figure 9. Barriers that kept the Indonesian students from learning more about microcomputers (n = 43)

Objective Two

Objective Two was to determine the importance of microcomputer competency as perceived by Indonesian students enrolled at agriculturally related departments in the United States. Table 11 shows the mean and standard deviation of the importance of microcomputer competency as perceived by the study participants. As mentioned previously in Chapter III, the participants responded to 43 statements written in a Likert-type format to measure the importance level for each microcomputer skill. The following rating scale was used to determine the importance of each microcomputer skill: (1) not important; (2) slightly important; (3) important; and (4) very important. There were five categories of statements; twelve pertained to the category of general information, eleven to word processing, seven to spreadsheets, five to databases, and eight to the category of other.

The highest importance scores were: "Prepare (format) a floppy diskette for use" (mean = 3.56); "Retrieve (load) previously stored computer activities for completion and /or update" (mean = 3.56); "Make appropriate backups or copies of files, programs, and data as required" (mean = 3.52); "Use a word processing program" (mean = 3.67); "Create and edit long documents such as reports or manuscripts" (mean = 3.56); "Use a spreadsheet program" (mean = 3.52); and "Use a statistical analysis program" (mean = 3.57).

Table 11. Importance scores for microcomputer skills

Skills	Mean	Std Dev
A. General		
1. Evaluate computer software in my discipline.	3.11	.72
2. Evaluate computer hardware in my discipline.	2.73	.88
3. Complete routine connections between computers and peripheral equipment such as printers, monitors, modems etc.	3.13	.71
4. Set up and place the microcomputer into operation.	3.41	.64
5. Load programs into the computer.	3.48	.62
6. Prepare (format) a floppy diskette for use.	3.56	.64
7. Transfer files from one disk to another.	3.44	.76
8. Interpret computer error messages that identify common operational problems and correct such problems.	3.48	.56
9. Store (save) incomplete microcomputer activities for completion at a later time.	3.48	.67
10. Retrieve (load) previously stored computer activities for completion and/or update.	3.56	.53
11. Make appropriate backups or copies of files, programs, and data as required.	3.52	.53
12. Assist in personal tasks and scheduling	2.87	.79
B. Word Processing		
1. Use a word processing program.	3.67	.48
2. Create bibliographies that can be easily updated or automatically converted to different format styles.	3.25	.67
3. Create and edit long documents such as reports or manuscripts.	3.56	.59

Table 11. Contd...

Skills		Mean	Std Dev
B.	Word Processing		
4.	Create and edit technical or scientific documents.	3.43	.64
5.	Generate outlines that can be quickly collapsed or expanded for use in such things as speeches or presentations.	3.17	.68
6.	Integrate data into personalized letters.	3.33	.62
7.	Check documents for typographical, spelling, and minor grammatical errors.	3.35	.68
8.	Create and edit instructional materials	3.03	.78
9.	Collect and retrieve notes.	3.13	.73
10.	Create form letters which can be personalized and merged with mailing lists.	2.84	.87
11.	Create, edit, and produce short documents such as memos or letters.	2.98	.75
C.	Spreadsheets/Statistics		
1.	Use a spreadsheet program.	3.52	.59
2.	Use a statistical analysis program.	3.57	.59
3.	Create graphs, charts and diagrams.	3.48	.59
4.	Develop budgets for projects or lab assignments so as to explore "what if" alternatives.	3.13	.68
5.	Perform mathematical calculations.	3.22	.73
6.	Perform advanced statistical analyses	3.35	.68
7.	Perform financial analyses.	3.02	.81
D.	Data Base		
1.	Use a data management program.	3.08	.83
2.	Search computer databases related to my field.	3.16	.79

Table 11. Contd...

Skills	Mean	Std Dev
D. Data Base		
3. Generate mailing lists.	2.54	.93
4. Generate mailing labels.	2.51	.95
5. Generate directories of telephone numbers, names, ages, etc.	2.46	.91
E - Other		
1. Transfer and receive files from other computers.	3.14	.72
2. Create overheads to use in instructional or professional presentations.	3.14	.72
3. Hook up the microcomputer to communicate with other computers.	3.02	.77
4. Transmit and receive messages via an electronic mail system.	2.95	.75
5. Access and retrieve information from commercially available computer networks/databases via computer and modem.	2.92	.75
6. Give instructions to a computer that will combine files prepared using one program with files prepared using a different program (e.g., a spreadsheet file with a word processing file).	3.16	.72
7. Use a programming language to create a software program.	2.94	.95
8. Use computer assisted instructional programs.	2.97	.82

Overall mean score = 3.18
Std Dev = .44

Table 11 shows that the mean scores of the statements varied as perceived by the study participants. However, the vast majority of the study participants indicated that the skills were very important (Figures 10, 11, and 12). Figure 10 shows that "Preparing (format) a floppy diskette for use" was very important to more than 60% of the respondents; important to 33% of the respondents; slightly important to three percent of the respondents; and not important to less than three percent of the study participants. Figure 11 presents the results that more than half of the study participants felt that the following microcomputer skills were very important: "Retrieve (load) previously stored computer activities for completion and /or update, and "Make appropriate backups or copies of files, programs, and data as required". Whereas a slightly smaller number (26 and 28, respectively) felt that these skills were important. Only one respondent felt that "Retrieve (load) previously stored computer activities for completion and /or update" and "Make appropriate backups or copies of files, programs, and data as required" were slightly important. Regarding information about the students'perceptions of "Using a word processing program", 42 participants felt that the skill was very important and 21 participants viewed it as important (Figure 12). A great number of participants (38, 36, and 39, respectively) perceived that skills such as:" Create long documents", "Use a spreadsheet program", and "Use a

statistical analysis program" were very important; a smaller number (22, 24, and 21, respectively) felt the skills were important; and only one of the study participants felt that theses particular skills were slightly important (Figure 12).

Skills that rated the highest of the importance scores pertained to the categories of general, word processing, and spreadsheets. Table 12 shows that the average importance score of the statements pertaining to the general, word processing, spreadsheets and other categories were higher than the "importance level" of 3.00. On the other hand, the average score pertaining to the database category was lower than the "importance level" of 3.00. This means that the students viewed the microcomputer skills pertaining to general, word processing, spreadsheets and other categories as more important than the skills pertaining to the database category.

Table 12. Average importance scores for microcomputer skills by skill category

Category	Mean	Stdv
General	3.31	.44
Word Processing	3.25	.50
Spreadsheets	3.33	.46
Data Base	2.75	.75
Other	3.03	.61

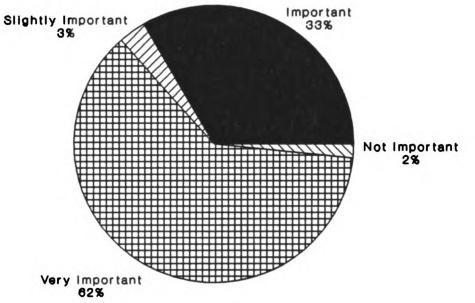

Figure 10. Importance level for preparing (format) a floppy diskette

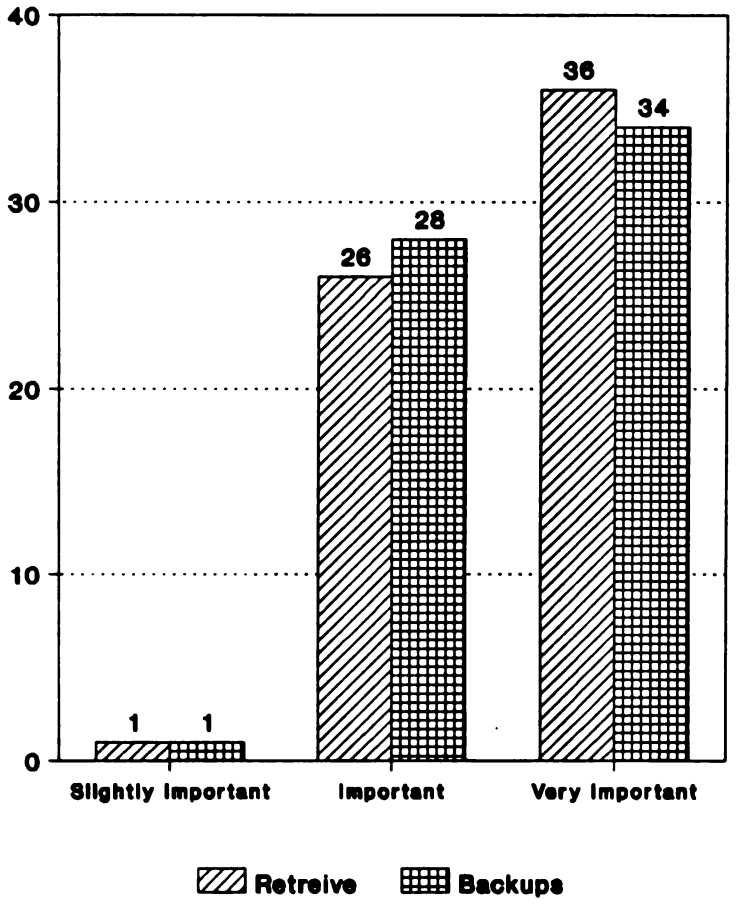

Figure 11. Importance level for retrieving (load) previously stored computer activities for completion and/or update, and for making appropriate backups or copies of files, programs, and data as required

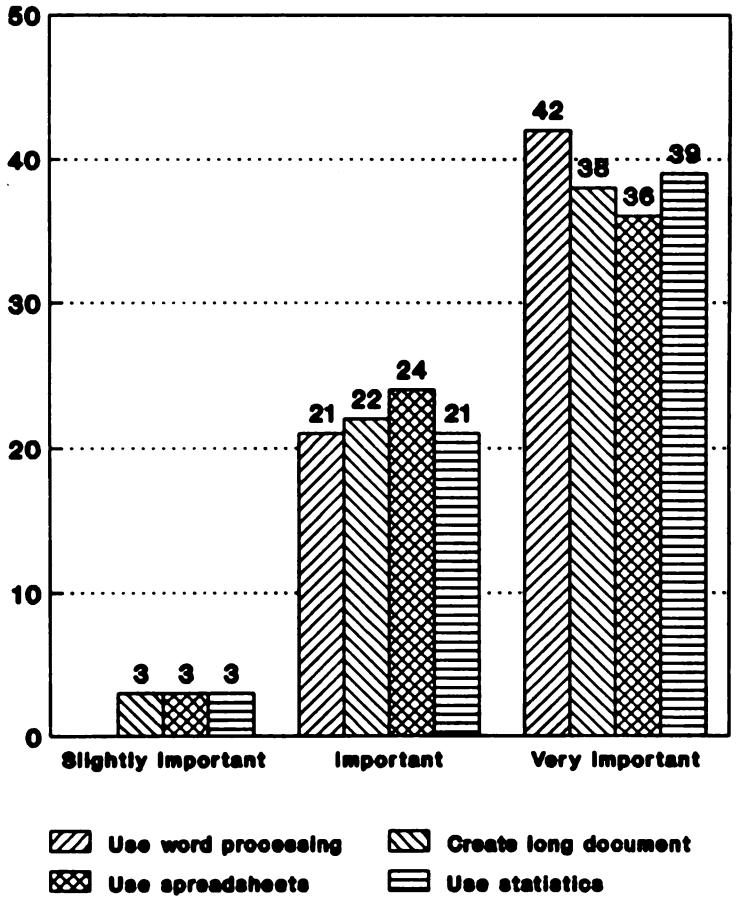

Figure 12. Level of importance for using word processing, creating long documents, using spreadsheets and using statistical analysis programs

Objective Three

Objective Three was to identify the perceived level of microcomputer competency possessed by Indonesian students enrolled at agriculturally related departments in the United States. The study participants responded to 43 statements. The statements were similar these previously used for determining the importance of microcomputer skills competency. A Likert-type scale ranging from 1-4 was employed for each statement to measure the perceived ability of the participants in this study. The scales were defined as: (1) no ability; (2) low ability; (3) moderate ability; and (4) high ability. As mentioned previously in Chapter III, the statements were categorized in four groups: twelve pertained to the category of general information, eleven to the category of word processing, seven to spreadsheets, five to databases, and eight to the category of other. The mean and standard deviations of the ability levels of the study participants are summarized in Table 13. The results in Table 13 show that the mean score of the ability statements varied as perceived by the Indonesian graduate students. The lowest mean score was 1.67, which was slightly under the "low ability" level of 2.00; the highest mean score was 3.40, which was above the "moderate ability" level of 3.00. The lowest scores fell under the category of other, whereas the highly rated scores pertained to the categories of general and word processing.

Table 13. Ability scores for microcomputer skills

Skills	Mean	Std Dev
A. General		
1. Evaluate computer software in my discipline.	2.68	.69
2. Evaluate computer hardware in my discipline.	2.22	.71
3. Complete routine connections between computers and peripheral equipment such as printers, monitors, modems etc.	2.75	.80
4. Set up and place the microcomputer into operation.	2.95	.71
5. Load programs into the computer.	3.00	.86
6. Prepare (format) a floppy diskette for use.	3.40	.66
7. Transfer files from one disk to another.	3.30	.75
8. Interpret computer error messages that identify common operational problems and correct such problems.	2.59	.71
9. Store (save) incomplete microcompute activities for completion later.	3.16	.79
10. Retrieve (load) previously stored computer activities for completion and/or update.	3.38	.66
11. Make appropriate backups or copies of files, programs, and data as required.	3.29	.77
12. Assist in personal tasks and scheduling.	2.65	.81
B. Word Processing		
1. Use a word processing program.	3.30	.64
2. Create bibliographies that can be easily updated or automatically converted to different format style.	2.62	.85
3. Create and edit long documents such as reports or manuscripts.	3.05	.89

Table 13. Contd...

Skills	Mean	Std Dev
B. Word Processing		
4. Create and edit technical or scientific documents.	2.83	.87
5. Generate outlines that can be quickly collapsed or expanded for use in such things as speeches or presentations.	2.59	.87
6. Integrate data into personalized letters.	2.70	.84
7. Check documents for typographical, spelling, and grammatical errors.	2.95	.77
8. Create and edit instructional materials.	2.62	.92
9. Collect and retrieve notes.	2.86	.88
10. Create form letters which can be personalized and merged with mailing lists.	2.48	.91
11. Create, edit, and produce short documents such as memos or letters.	2.84	.92
C. Spreadsheets/Statistics		
1. Use a spreadsheet program.	2.86	.90
2. Use a statistical analysis program.	2.87	.81
3. Create graphs, charts and diagrams.	2.92	.83
4. Develop budgets for projects or lab assignments so as to explore "what if" alternatives.	2.35	.83
5. Perform mathematical calculations.	2.75	.88
6. Perform advanced statistical analyses	2.56	.88
7. Perform financial analyses.	2.13	.85
D. Data Base		
1. Use a data management program.	2.16	.77
2. Search computer databases related to my field.	2.35	.79

Table 13. Contd...

Skills	Mean	Std Dev
D. Data Base		
3. Generate mailing lists.	2.05	.75
4. Generate mailing labels.	1.95	.79
5. Generate directories of telephone numbers, names, ages, etc.	2.19	.84
E - Other		
1. Transfer and receive files from other computers.	2.19	.82
2. Create overheads to use in instructional or professional presentations.	2.21	.86
3. Hook up the microcomputer to communicate with other computers.	1.86	.78
4. Transmit and receive messages via an electronic mail system.	1.89	.86
5. Access and retrieve information from commercially available computer networks/databases via computer and modem.	1.67	.72
6. Give instructions to a computer that will combine files prepared using one program with files prepared using a different program.	1.97	.90
7. Use a programming language to create a software program.	1.73	.77
8. Use computer assisted instructional programs.	1.84	.81

Overall mean score = 2.57
Std Dev = .50

Table 14 shows that skills pertaining to the categories of general, word processing, spreadsheets, and databases are have higher ability scores than skills pertain to the other category. This means that students perceived higher competency in performing microcomputer skills pertaining to the general, word processing, database and spreadsheet categories, than they did in performing skills pertaining to the other category.

Table 14. Average ability score for microcomputer skills by skill category

Category	Mean	Stdv
General	2.95	.50
Word Processing	2.80	.68
Spreadsheets	2.63	.66
Data Base	2.14	.66
Other	1.92	.58

In this study, most of the students felt that their ability to perform microcomputer skills was lower than their perceptions of the importance of each microcomputer skill. More than 50 percent of the statements ranked below the moderate ability level. The skills that were ranked mostly below moderate ability were considered to be due to limited experience with microcomputers. These results correspond with those shown previously in Figure 5, that more than 90 percent of the Indonesian students had less than five years

experience with microcomputers prior to coming to the United States.

Most skills that received scores above the moderate ability level were those that ranked above important such as: "Prepare (format) a floppy diskette for use" (mean = 3.40); "Retrieve (load) previously stored computer activities for completion and /or update" (mean = 3.38); "Make appropriate backups or copies of files, programs, and data as required" (mean = 3.29); "Use a word processing program" (mean = 3.30); "Create and edit long documents such as a report or manuscript" (mean = 3.05). Two skills that were ranked with high importance rating received slightly lower than moderate ability scores. These were: "Use a spreadsheet program" (mean = 2.86); and "Use a statistical analysis program" (mean = 2.87).

Skills receiving lower than low ability scores were those associated with the database and other categories. They were: "Generate mailing labels" (mean = 1.95), "Hook up the microcomputer to communicate with other computers" (mean = 1.86), "Transmit and receive messages via an electronic mail system" (mean = 1.89), "Access and retrieve information from commercially available computer networks/databases via computer and modem" (mean = 1.67), "Give instructions to a computer that will combine files prepared using one program with files prepared using a different program (e.g., a spreadsheet file with a word

processing file)" (mean = 1.97), "Use a programming language to create a software program" (mean = 1.73), and "Use computer assisted instructional programs" (mean = 1.84). A great number of the participants felt that they had no ability or low ability in performing those specific skills (Figures 13, 14, and 15). Figure 13 shows that more than 30 percent of the respondents perceived that they had no ability to generate mailing labels; a slightly higher number (42 percent) felt they had low ability; 23 percent felt they had moderate ability, and only one respondent felt he had high ability. Figures 14 and 15 present the information related to the competency (ability) levels of the study participants in regard to performing specific skills associated with communications, merging, programming language, and computer instructional programs. As can be seen, more than 20 participants rated themselves as having no ability to perform those specific skills. A comparable number felt that they had low ability, and less than half perceived they had moderate ability and/or high ability to perform those skills associated with communications, filing combinations, programming language, and computer instructional programs.

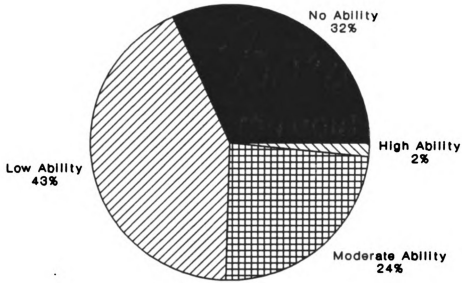

Figure 13. Level of ability to generate mailing labels

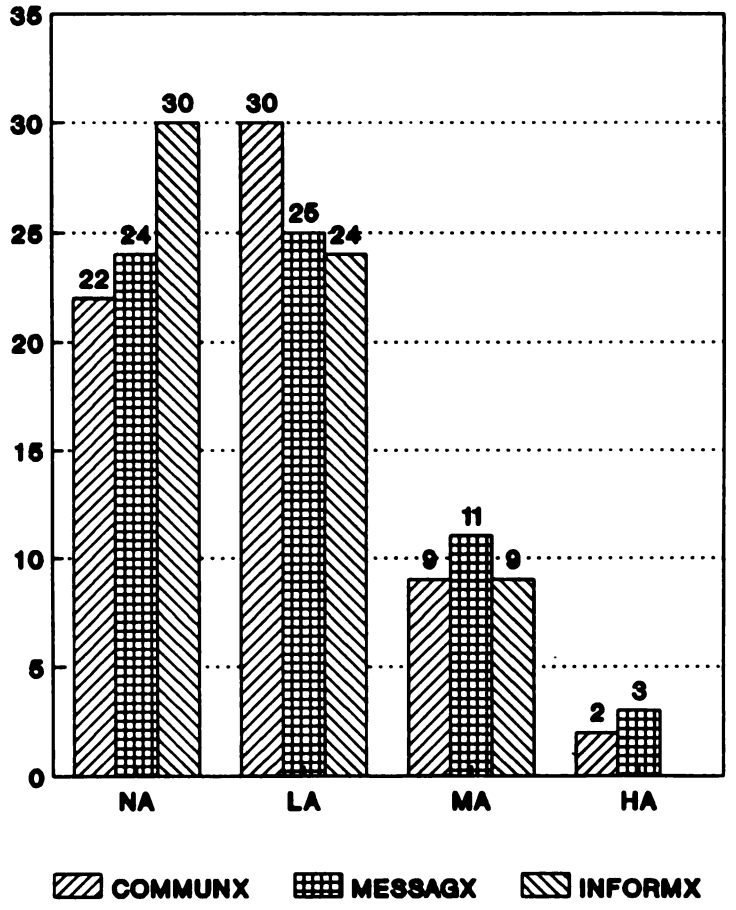

Figure 14. Level of ability to perform specific skills related to communications

Ability Level:
NA - No Ability
LA - Low Ability
MA - Moderate Ability
HA - High Ability

Variables:
COMMUNX - hook up the microcomputer to communicate with other computers
MESSAGX - transmit and receive messages via an electronic mail system
INFORMX:- access and retrieve information from commercially available computer networks/databases via computer and a modem

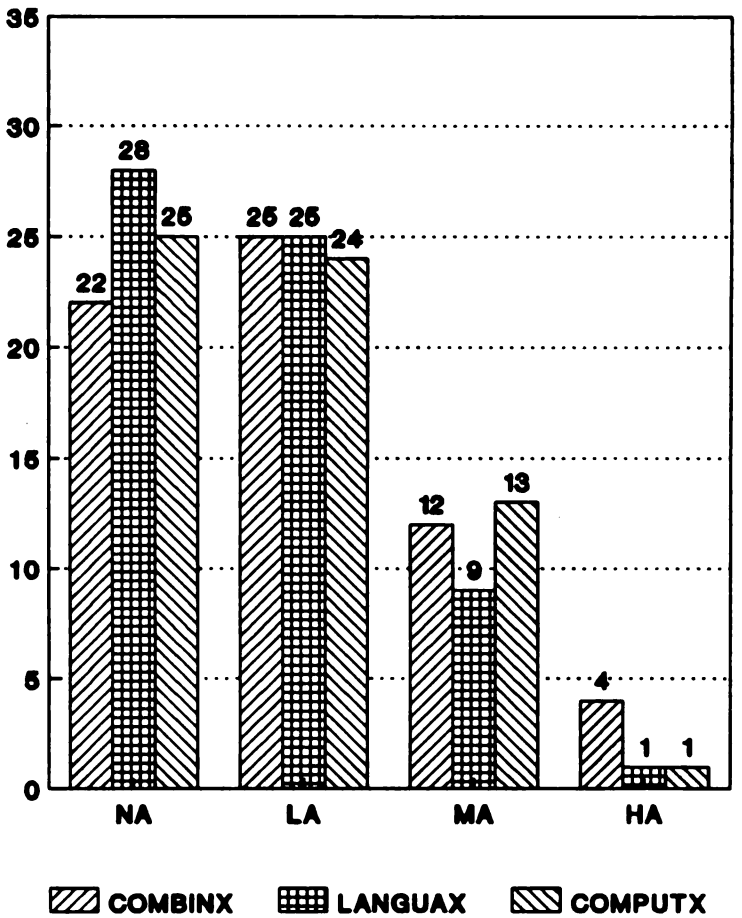

Figure 15. Level of ability to perform specific skills related to file combinations, programming language and computer instructional programs

Ability Level:
NA - No Ability
LA - Low Ability
MA - Moderate Ability
HA - High Ability

Variables:
COMBINX: give instructions to a computer that will combine files prepared using one program with files prepared using a different program (e.g., a spreadsheet file with a word processing file)
LANGUAX: use a programming language to create a software program
COMPUTX: use computer assisted instructional programs

Objective Four

The fourth objective of the study was to determine the perceived level of microcomputer competency needed by Indonesian students enrolled at agriculturally related departments in the United States. A Needs Assessment Model developed by Borich (1980) was used to determine the competency needs of the respondents. Each competency need was the difference between perceived importance and perceived ability. Competency need, or "knowledge discrepancy", was ordered according to magnitude or relative weight, calculated by multiplying the average score of perceived importance of all the respondents by the discrepancy score. Knowledge discrepancy was defined by Sherman (1986), in Ellis and Odell (1990), as Borich's Priority Needs Index (PNI). The formula used for the calculation was the following:

$$PNI = (I - A) \times \bar{I}$$ whereas

I= perceived importance score of each skill pertaining to the categories of general, word processing, spreadsheets, databases, and other

A= perceived ability score of each skill pertaining to the categories of general, word processing, spreadsheets, databases, and other

$\bar{I}$= average score of perceived importance of all the participants.

The mean and standard deviation scores of the PNI of the study participants are summarized in Table 15.

Table 15. Priority Needs Index (PNI) scores for microcomputer skills

Skills	Mean	Std Dev
A. General		
1. Evaluate computer software in my discipline.	1.33	2.54
2. Evaluate computer hardware in my discipline.	1.39	2.35
3. Complete routine connections between computers and peripheral equipment such as printers, monitors, modems etc.	1.19	2.94
4. Set up and place the microcomputer into operation.	1.57	2.93
5. Load programs into the computer.	1.66	3.30
6. Prepare (format) a floppy diskette for use.	.57	3.08
7. Transfer files from one disk to another.	.49	3.49
8. Interpret computer error messages that identify common operational problems and correct such problems.	3.09	2.87
9. Store (save) incomplete microcomputer activities for completion later.	1.10	3.30
10. Retrieve (load) previously stored computer activities for completion and/or update.	.62	2.44
11. Make appropriate backups or copies of files, programs, and data as required.	.84	2.73
12. Assist in personal tasks and scheduling	.64	2.98
B. Word Processing		
1. Use a word processing program.	1.34	2.74
2. Create bibliographies that can be easily updated or automatically converted to different format style.	2.06	3.21
3. Create and edit long documents such as reports or manuscripts.	1.81	3.44

Table 15. Contd...

Skills	Mean	Std Dev
B. Word Processing		
4. Create and edit technical or scientific documents.	2.07	3.29
5. Generate outlines that can be quickly collapsed or expanded for use in such things as speeches or presentations.	1.86	3.15
6. Integrate data into personalized letters.	2.11	3.45
7. Check documents for typographical, spelling, and grammatical errors.	1.33	3.33
8. Create and edit instructional materials.	1.25	3.25
9. Collect and retrieve notes.	.84	3.14
10. Create form letters which can be personalized and merged with mailing lists.	1.04	3.47
11. Create, edit, and produce short documents such as memos or letters.	.43	3.46
C. Spreadsheets/Statistics		
1. Use a spreadsheet program.	2.35	3.35
2. Use a statistical analysis program.	2.50	3.66
3. Create graphs, charts and diagrams.	1.93	3.41
4. Develop budgets for projects or lab assignments so as to explore "what if" alternatives.	2.43	3.30
5. Perform mathematical calculations.	1.53	3.26
6. Perform advanced statistical analyses	2.66	3.62
7. Perform financial analyses.	2.68	3.48
D. Data Base		
1. Use a data management program.	2.84	2.89
2. Search computer databases related to my field.	2.56	3.05

Table 15. Contd...

Skills		Mean	Std Dev
D.	Data Base		
3.	Generate mailing lists.	1.25	2.73
4.	Generate mailing labels.	1.39	2.66
5.	Generate directories of telephone numbers, names, ages, etc.	.66	2.73
E.	Other		
1.	Transfer and receive files from other computers.	2.99	3.67
2.	Create overheads to use in instructional or professional presentations.	2.94	2.87
3.	Hook up the microcomputer to communicate with other computers.	3.50	2.98
4.	Transmit and receive messages via an electronic mail system.	3.14	3.63
5.	Access and retrieve information from commercially available computer networks/databases via computer/modem.	3.59	3.24
6.	Give instructions to a computer that will combine files prepared using one program with files prepared using a different program.	3.76	3.40
7.	Use a programming language to create a software program.	3.55	3.47
8.	Use computer assisted instructional programs.	3.35	2.99

Overall mean = 1.91
Std Dev = 2.22

The results in Table 15 show that the mean scores of the PNI varied. The highest PNI scores were for the following skills: "Interpret computer error messages that identify common operational problems and correct such problems" (mean = 3.09), "Hook up the microcomputer to communicate with other computers" (mean = 3.50), "Transmit and receive messages via an electronic mail system" (mean = 3.14), "Access and retrieve information from commercially available computer networks/databases via computer and modem" (mean = 3.59), "Give instructions to a computer that will combine files prepared using one program with files prepared using a different program (e.g., a spreadsheet file with a word processing file)" (mean = 3.76), "Use a programming language to create software" (mean = 3.55), "Use computer assisted instructional programs" (mean =3.35).

In this study, microcomputer skills having the greatest educational needs were associated with the categories of general and other. It is interesting to note that, of the seven skills reported as having the highest importance scores, none of them were included in the skills receiving the highest PNI scores. However, of the seven skills reported as having the lowest ability scores, six were included in the skills receiving the highest PNI scores. Table 16 shows the mean importance scores and the mean ability scores of the skills receiving the greatest PNI scores.

Table 16. Mean scores of the microcomputer skills having the greatest educational needs

Skill	PNI	Mean Importance	Ability
Interpret computer error messages to identify common operational problems and correct such problems.	3.09	3.48	2.59
Hook up the microcomputer to communicate with other computers.	3.50	3.02	1.86
Transmit and receive messages via an electronic mail system.	3.14	2.95	1.89
Access and retrieve information from commercially available computer networks/ databases via computer and modem.	3.59	2.92	1.67
Give instructions to a computer to combine files prepared using one program with files prepared using a different program.	3.76	3.16	1.97
Use a programming language to create a software program.	3.55	2.94	1.73
Use computer assisted instructional programs.	3.35	2.97	1.84

Other microcomputer skills such as: "Perform advanced statistical analyses", "Perform financial analyses", "Use a data management program", "Search computer databases related to my field", "Transfer and receive files from other computers", and "Create overheads to use in instructional or professional presentations" can be considered as important educational needs of the participants, too. The PNI scores

of those skills were relatively high. Besides, those particular skills were ranked as being slightly higher in importance, and their ability levels were rated lower than the "moderate ability" level. Table 17 summarizes additional microcomputer education needs of the study participants.

Table 17. Mean score additional microcomputer education needs

Skill	Mean PNI	Mean Importance	Mean Ability
Perform advanced statistical analysis.	2.66	3.35	2.56
Perform financial analyses.	2.68	3.02	2.13
Use a data management program.	2.84	3.08	2.16
Search computer databases related to my field.	2.56	3.16	2.35
Transfer and receive files from other computers.	2.99	3.14	2.19
Create overheads to use in instructional or professional presentations.	2.94	3.14	2.21

Objective Five

The fifth objective of the study was to determine if Indonesian students had different perceptions of their microcomputer education needs when examined in relation to their demographic characteristics. The microcomputer education needs were ordered based on the scores of the Priority Needs Index (PNI). Table 18 shows the average PNI scores of skills reported as being most useful for educational purposes.

Table 18. Average PNI scores of skills reported as serving the greatest educational needs

Skill	Average PNI scores
Give instructions to combine...	3.76
Access and retrieve information...via modem	3.59
Transfer and receive files...	3.55
Use a programming language...	3.55
Hook up the computer to communicate with other...	3.50
Create overheads...	3.35
Use computer assisted...	3.35
Transmit and receive messages via electronic mail system...	3.14
Interpret computer error...	3.09
Use data management program	2.84
Perform financial analyses	2.68
Perform advanced stat...	2.66
Search computer databases...	2.56

T-tests were performed for each of the following skills: "Give instructions to a computer that will combine files prepared using one program with files prepared using a different program", "Access and retrieve information from commercially available computer networks/databases via computer and modem", "Transfer and receive files from other computers", "Use a programming language to create a software program", "Hook up the microcomputer to communicate with other computers", "Create overheads to use in instructional or professional presentations", "Use computer assisted instructional programs", "Transmit and receive messages via an electronic mail system", "Interpret computer error messages to identify common operational problems and correct such problems", "Use a data management program", "Search computer databases related to my field", "Perform financial analyses", and "Perform advanced statistical analyses". Tables 19 and 20 show the T-test analyses to see if the students' gender and age were perceived differently for each of those skills. No significant differences in perception were observed between the two demographic characteristics of gender and age as can be seen by the PNI scores. Whether male or female, young or old, there were no differences in their perceptions about microcomputer education needs.

Table 19. T-test analyzing particular PNI scores regarding the gender of the participants

Skill	Gender Male $\bar{X}$ (n=48)	Female $\bar{X}$ (n=15)	t-value[a]
Give instruction to combine...	3.49	4.63	1.14
Access and retrieve information...via modem	3.47	4.18	.51
Transfer and receive files...	2.82	3.56	.68
Use a programming language...	3.31	4.31	.98
Hook up the computer to communicate with other...	3.33	4.03	.78
Create overheads...	3.01	2.72	.34
Use computer assisted...	3.34	3.37	.03
Transmit and receive messages via electronic mail system...	2.95	3.74	.73
Interpret computer error...	3.05	3.25	.24
Use data management program	2.70	3.29	.69
Perform financial analyses	2.39	3.62	1.20
Perform advanced stat...	2.58	2.90	.30
Search computer databases...	2.50	2.74	.26

[a] No significant difference between two groups at .05 level.

Table 20. T-test analyzing particular PNI scores regarding the ages of the participants

Skill	Age (Years) 25-35 $\bar{X}$ (n=37)	>35 $\bar{X}$ (n=26)	t-value[a]
Give instruction to combine...	3.42	4.25	.96
Access and retreive information ...via modem	3.17	4.20	.97
Transfer and receive files...	2.97	3.02	.05
Use a programming language...	3.89	3.05	.95
Hook up the computer to communicate with other...	3.59	3.37	.29
Use computer assisted...	3.37	3.31	.08
Create overheads...	3.06	2.78	.38
Transmit and receive messages via electronic mail system...	3.43	2.72	.76
Interpret computer error...	2.82	3.48	.89
Use data management program	2.75	2.96	.29
Perform financial analyses	2.29	3.25	1.09
Perform advanced stat...	2.63	2.71	.09
Search computer databases...	2.31	2.92	.78

[a] No significant difference between two groups at .05 level.

Table 21 contains data from a T-test analyzing particular PNI scores regarding the status of the participants. The finding shows that married participants had different PNI score than single students regarding one specific skill: "Search computer databases related to my field". No significant differences were found between married and single respondents for other PNI scores.

Table 21. T-test analyzing particular PNI scores regarding the status of the participants

Skill	Status Married $\bar{X}$ (n=55)	Single $\bar{X}$ (n=8)	t-value
Give instruction to combine..	3.80	3.55	.18
Access and retreive information ...via modem	3.89	1.95	1.37
Transfer and receive files...	3.20	1.57	1.26
Use a programming language...	3.74	2.20	1.17
Hook up the computer to communicate with other...	3.62	2.64	.87
Create overheads...	3.14	1.57	1.70
Use computer assisted...	3.56	1.86	1.52
Transmit and receive messages via electronic mail system...	3.22	2.58	.46
Interpret computer error...	3.29	1.74	1.44
Use data management program	2.91	2.31	.55
Perform financial analyses	2.69	2.64	.04
Perform advanced stat...	2.81	1.67	.82
Search computer databases...	2.87	.40	2.21*

* Significant difference between two groups at .05 level

Table 22 shows that the study participants had different educational needs when examined in relation to their level of education prior to entering the United States. Findings show that students with bachelor's degrees had higher PNI scores than those with master's degrees for the following specific skills: "Perform advanced statistical

analyses"; "Search computer databases related to their fields"; and "Transmit and receive messages via an electronic mail system". No differences were observed between these two groups of students when considering different levels of education for other PNI scores.

Table 22. T-test analyzing particular PNI scores when considering level of education of participants before studying in the United States

Skill	Education BS $\bar{X}$ (n=53)	MS $\bar{X}$ (n=10)	t-value
Give instruction to combine...	3.82	3.48	.29
Access and retrieve information ...via modem	3.75	2.19	.91
Transfer and receive files...	3.20	1.04	.97
Use a programming language...	3.88	1.76	1.80
Hook up the computer to communicate with other...	3.70	2.42	1.26
Create overheads...	3.14	1.88	1.28
Use computer assisted...	3.47	2.67	.77
Transmit and receive messages via electronic mail system...	3.62	.59	2.52*
Interpret computer error...	3.35	1.74	1.65
Use data management program	3.08	1.54	1.56
Perform financial analysis	2.74	2.42	.26
Perform advanced stat...	3.16	0.00	2.65*
Search computer databases...	2.98	.32	2.66*

* Significant difference between two groups at .05 level

Students pursuing master's degrees had significantly different perceptions of microcomputer education needs than doctoral students. Table 23 shows that the need for the following skills: "Perform advanced statistical analysis"; "Use a data management program"; "Search computer database related to my field"; "Transmit and receive messages via an electronic mail system"; and "Use a programming language to create a software program", were significantly different at the level of .05, for masters students than for doctoral students. No significant differences were observed between the masters and PhD students for the following skills: "Interpret computer error messages to identify common operational problems and correct such problems", "Perform financial analyses", "Transfer and receive files from other computers", "Create overheads to use in instructional or professional presentations", "Hook up the microcomputer to communicate with other computers", "Transmit and receive messages via an electronic mail system", "Access and retrieve information from commercially available computer networks/databases via computer and modem", "Give instructions to a computer to combine files prepared using one program with files prepared using a different program", and "Use computer assisted instructional program".

Table 23. T-test analyzing particular PNI scores regarding degree of the participants

Skill	Degree MS $\bar{X}$ (n=47)	PhD $\bar{X}$ (n=16)	t-value
Give instruction to combine...	3.90	3.36	.55
Access and retrieve information ...via modem	3.96	2.19	1.39
Transfer and receive files...	3.27	2.16	1.05
Use a programming language...	4.19	1.65	2.65*
Hook up the computer to communicate with other...	3.79	2.64	1.34
Create overheads...	3.27	1.96	1.60
Use computer assisted...	3.66	2.41	1.46
Transmit and receive messages via electronic mail system...	3.89	.92	3.01*
Interpret computer error...	3.79	2.64	1.87
Use data management program	3.34	1.35	2.48*
Perform financial analyses	3.02	1.70	1.32
Perform advanced stat...	3.49	.21	3.39*
Search computer databases...	3.03	1.19	2.15

* Significant difference between two groups at .05 level

Table 24 shows that students who did not own microcomputers held higher PNI scores on certain skills than students who had microcomputers. The differences were statistically significant at the .05 level. In other words, students who did not own microcomputers had higher education

needs than students who owned microcomputers, for selected microcomputer skills.

Table 24. T-test analyzing particular PNI scores regarding microcomputer ownership of the participants

Skill	Micro ownership Yes $\bar{X}$ (n=31)	No $\bar{X}$ (n=32)	t-value
Give instruction to combine...	2.85	4.64	2.15*
Access and retrieve information ...via modem	2.63	4.61	1.98
Transfer and receive files...	2.13	3.83	1.87
Use a programming language...	2.85	4.23	1.60
Hook up the computer to communicate with other...	3.02	3.96	1.26
Create overheads...	2.43	3.43	1.40
Use computer assisted...	2.68	3.99	1.76
Transmit and receive messages via electronic mail system...	2.57	3.69	1.23
Interpret computer error...	2.58	3.59	1.40
Use data management program	2.19	3.47	1.79
Perform financial analyses	1.36	3.96	3.18*
Perform advanced stat...	1.51	3.76	2.59*
Search computer databases...	1.63	3.46	2.47*

* Significant difference between two groups at .05 level

Table 25 compares the studens't years of microcomputer ownership to the students' perception about microcomputer education needs. No significant differences were found in the PNI scores between the two groups of students who owned microcomputer for different lengths of time.

Table 25. T-test analyzing particular PNI scores regarding the length of time of microcomputer ownership

Skill	Length of time had own micro 0-1 Year $\bar{X}$ (n=18)	>1 Year $\bar{X}$ (n=13)	a t-value
Interpret computer error...	2.32	2.94	.67
Perform advanced stat...	1.12	2.06	.65
Perform financial analyses	.84	2.09	.94
Use data management program	2.57	1.66	.80
Search computer databases...	1.76	1.46	.27
Transfer and receive files...	2.27	1.93	.24
Create overheads...	2.62	2.17	.48
Hook up the computer to communicate with other...	3.02	3.02	.00
Transmit and receive messages via electronic mail system...	3.28	1.59	1.26
Access and retrieve information ...via modem	2.60	2.65	.04
Give instruction to combine...	2.81	2.92	.09
Use a programming language...	2.94	2.71	.17
Use computer assisted...	1.98	3.65	1.77

[a] No significant difference between two groups at .05 level

T-tests were also performed to see if the educational needs of Indonesian students who had microcomputer experience while working in Indonesia differed with those who did not. Table 26 shows that no significant differences were observed in PNI scores between the two groups of students who had different microcomputer experiences.

Table 26. T-test analyzing particular PNI scores regarding the microcomputer experience of participants while working in Indonesia

Skill	Use microcomputer in work Yes $\bar{X}$	No $\bar{X}$	t-value [a]
Give instruction to combine.. .	3.47	4.31	.94
Access and retrieve information ...via modem	3.97	2.92	.97
Transfer and receive files...	2.68	3.57	.91
Use a programming language...	3.37	3.88	.55
Hook up the computer to communicate with other...	3.54	3.43	.13
Create overheads...	2.55	3.07	.63
Use computer assisted...	3.19	3.65	.58
Transmit and receive messages via electronic mail system...	2.95	3.49	.56
Interpret computer error...	2.80	3.64	1.11
Use data management program	2.70	3.08	.49
Perform financial analyses	2.58	2.88	.33
Perform advanced stat...	2.70	2.59	.11
Search computer databases...	2.39	2.87	.60

[a] No significant difference between two groups at .05 level

All the study participants, whether having used microcomputers while working or not, did not have different perceptions of microcomputer education needs.

One-way analysis of variance and B-Tukey procedures were used to examine differences in microcomputer educational needs for the demographic variable of working experience prior to enrollment in agriculturally related departments in the United States, and length of enrollment in the United States. Table 27 shows that no significant differences at the .05 level were found among Indonesian students who had different working experiences with respect to some specific microcomputer skills. Similarly, Table 28 shows no significant differences observed in PNI scores among the students who were enrolled for different lengths of time at agriculturally related departments in the United States. All the respondents, whether enrolled at agriculturally related departments in the United States for less than one year or more, did not hold different perceptions in terms of microcomputer education needs.

Table 27. Analysis of variance of particular PNI scores when considering participants'working experiences

Skill	Working experience (Years) 1-5 $\bar{X}$ (n=15)	6-10 $\bar{X}$ (n=31)	>11 $\bar{X}$ (n=17)	F[a]
Give instruction to combine...	3.79	3.26	4.65	.91
Access and retrieve information ...via modem	2.43	3.43	5.25	2.24
Transfer and receive files...	2.51	2.84	3.69	.46
Use a programming language...	3.33	3.98	2.94	.53
Hook up the computer to communicate with other...	3.22	3.21	4.26	.76
Create overheads...	3.14	2.94	2.77	.06
Use computer assisted...	3.17	3.54	3.14	.13
Transmit and receive messages via electronic mail system...	3.34	2.85	3.47	.18
Interpret computer error...	2.78	2.37	2.87	.28
Use data management program	1.85	3.08	3.26	1.18
Perform financial analyses	2.62	2.24	3.55	.78
Perform advanced stat...	.89	3.24	3.15	2.46
Search computer databases...	1.47	3.06	2.60	1.38

[a] No siginificant difference among groups at .05 level

Table 28. Analysis of variance of particular PNI scores when considering lengths of stay in the United States

Skill	Length of enrollment (Years) 0-1 $\bar{X}$ (n=17)	>1-2 $\bar{X}$ n=34)	>2 $\bar{X}$ (n=12)	F[a]
Give instruction to combine...	3.72	3.81	3.69	.01
Access and retrieve information ...via modem	4.87	3.32	2.92	.94
Transfer and receive files...	2.59	3.23	2.88	.18
Use a programming language...	3.46	4.15	1.96	1.82
Hook up the computer to communicate with other...	4.44	3.38	2.52	1.56
Create overheads...	2.96	3.05	2.62	.10
Use computer assisted...	3.67	3.32	2.97	.19
Transmit and receive messages via electronic mail system...	4.51	2.95	1.72	2.27
Interpret computer error...	2.46	3.58	2.61	1.84
Use data management program	3.44	2.99	1.54	1.66
Perform financial analyses	3.55	2.66	1.51	1.22
Perform advanced stat...	3.35	2.86	1.12	1.47
Search computer databases...	3.35	2.51	1.58	1.20

[a] No significant difference among groups at .05 level

Analysis of variance was also used to determine if differences in educational needs existed relative to the participants' fields of study. As mentioned previously in Objective I, students were studying agriculturally related disciplines in nine fields of study. Due to the nature and characteristics of the disciplines, the fields of study were

classified into three groups. The first group (A) consisted of disciplines related to economics, social science and engineering, such as agricultural economics, agricultural extension and education, resource economics and agricultural engineering. The second group (B) consisted of disciplines related to the environment, such as environmental science, forestry, fisheries and animal science. The third group (C) related to food crops, such as horticulture, crop and soil science, entomology, and food science. The results of the one way analysis of variance and B-Tukey procedures comparing the participants'fields of study with microcomputer education needs are summarized in Table 29. As can be seen in Table 29, significant difference was found between the students enrolled in the fields of animal science, fisheries, environmental science and forestry, and the students in the fields of agricultural economics, agricultural extension and education, agricultural engineering and resource economics, in one specific skill: "Use a data management program". In other words, students in the fields of agricultural economics, agricultural extension and education, agricultural engineering and resource economics, differed in educational need with those students in the fields of animal science, fisheries, environmental science and forestry regarding using a data management program. No significant difference was found between the students who were studying animal science, environmental

science, fisheries, and forestry, with those who were studying horticulture, biology, crop and soil science, entomology and food science in using a data management program. Similarly, no significant difference was observed between students who were studying agricultural economics, agricultural extension and education, agricultural engineering and resource economics and those who were studying horticulture, biology, crop and soil science, entomology, and food science, regarding using a data management program. Furthermore, no significant differences were found among the Indonesian students in different fields of study for other PNI scores of microcomputer skills.

T-test procedures were performed to assess if significant differences existed in the applications of microcomputers by the study participants in relation to microcomputer education needs. In this study, the students were divided into two groups based on their use of microcomputer applications. The first group (A) consisted of students who had used not only common application programs such as word processing and/ or spreadsheets, but also other applications such as statistics and programming language. The second group consiststed of students who had used only common application programs.

Table 29. Analysis of variance of particular PNI scores regarding the fields of study of the participants in the United States

Skill	Fields of study[a] A $\bar{X}$ (n=22)	B $\bar{X}$ (n=24)	C $\bar{X}$ (n=17)	F
Give instruction to combine..	3.16	4.61	3.35	1.23
Access and retrieve information ...via modem	3.31	4.38	3.09	1.11
Transfer and receive files...	1.57	3.92	3.51	2.74
Use a programming language...	3.21	3.80	3.63	.17
Hook up the computer to communicate with other...	2.75	4.28	3.38	1.57
Create overheads...	2.00	3.40	3.51	1.88
Use computer assisted...	2.97	3.84	3.14	.53
Transmit and receive messages via electronic mail system...	2.55	4.06	2.60	1.25
Interpret computer error...	2.68	2.76	4.09	1.44
Use data management program	1.82	3.85*	2.72	3.04
Perform advanced stat...	1.83	3.21	2.96	.91
Perform financial analyses	2.20	2.77	3.20	.40
Search computer databases...	2.30	2.90	2.42	.24

[a] Fields of study:

A = Agric.Economics; Agric.Extension & Ed.; Agric.Engineering; Resource Economics
B = Animal Science; Environmental Science; Fisheries; Forestry
C = Horticulture; Biology; Crop and Soil Science; Entomology; Food Science

* Significant difference between group B and A at the .05 level

Table 30 shows that significant differences at the .05 level were observed among the study participants regarding different microcomputer applications in terms of the following microcomputer education needs: "Perform financial analyses"; "Use a data management program"; "Create overheads to use in instructional or professional presentations"; and "Access and retrieve information from commercially available computer networks/databases via computer and modem". In other words, students who mainly used word processing and spreadsheets scored significantly higher on the PNI scores of these microcomputer skills than other students who had used, not only word processing and spreadsheets, but also other application programs. No significant differences at the level of .05 were observed between these two groups of students who used different microcomputer applications for the following skills: "Give instructions to a computer that will combine files prepared using different programs"; "Transfer and receive files from other computers"; "Use a programming language to create a software program"; "Hook up the computer to communicate with others"; "Use computer assisted instructional programs"; "Transmit and receive messages via an electronic mail system"; "Interpret computer error messages that identify common operational problems and correct such problems"; "Perform advanced statistical analyses"; and "Search computer databases related to my field".

Table 30. T-test analyzing particular PNI scores when considering the application of microcomputers by the participants

Skill	Micro application[a] A $\bar{X}$ (n=17)	B $\bar{X}$ (n=24)	t-test
Give instruction to combine..	2.42	4.21	1.64
Access and retrieve information ...via modem	2.40	4.86	2.51*
Transfer and receive files...	2.22	3.01	.65
Use a programming language...	2.42	4.04	1.38
Hook up the computer to communicate with other...	2.84	4.03	1.14
Create overheads...	1.48	3.27	2.01*
Use computer assisted...	2.79	3.47	.65
Transmit and receive messages via electronic mail system...	2.08	3.56	1.19
Interpret computer error...	2.86	2.76	.13
Use data management program	1.27	3.72	2.86*
Perform financial analyses	.89	3.78	2.67*
Perform advanced stat...	1.38	3.63	1.87
Search computer databases...	1.30	3.16	1.79

[a] Micro application:
A = Word processing, dbase, spreadsheets;
Word processing & dbase;
Word processing & statistics;
Word processing, spreadsheet, statistics;
Word processing, programming language;
Word processing, spreadsheets,dbase, statistics;
Word processing, spreadsheets, dbase, and programming
B = Word processing & spreadsheets; Word processing

* Significant difference between two groups at .05 level

Objective Six

The sixth objective of the study determined the relationships between the students' demographic variables of status, level of education prior to entering the United States, degree pursued, microcomputer ownership, age, working experience, microcomputer experience, length of enrollment in the United Sates, and student PNI scores on the perceived microcomputer education needs. Table 31 shows the codes used for these variables.

Table 31. Variables and the codes used for demographic charactersistics

Variables	Codes
Status	1=never married 2=married
Education	1=BS 2=MS
Degree sought	1=MS 2=PhD
Micro ownership	1=no 2=yes
Age (years)	continuous (range 27 - 50)
Working experience (years)	continuous (range 1 -25)
Micro experience (years)	continuous (range 1-12)
Length of enrollment in USA (months)	continuous (range 3-84)

Cramer's V correlation coefficients were computed to determine the relationships between status, level of education, degree sought, microcomputer ownership and the students' PNI scores on the perceived microcomputer education needs (Table 32). As shown in Table 32, the results of the correlation coefficients indicate that most of the relationships were "low" and "moderate". The coefficients ranged from a low of .02 to a high of .46. The highest correlation coefficient exists between microcomputer ownership and one specific skill:"Perform advanced statistical analyses". Other skills that had moderate relationships with microcomputer ownership were: "Give instructions to a computer to combine files prepared using one program with files prepared using a different program," and "Perform financial analyses". Besides, the variables of education, and degree sought, both had "moderate" positive relationships with the following skills: "Access and retrieve information from commercially available computer networks/databases via computer and modem"; "Transmit and receive messages via an electronic mail system"; "Perform advanced statistical analyses"; and " Search computer databases related to my field". The lowest coefficient exists between the variable of status and the following skill: "Give instructions to a computer to combine files prepared using one program with files prepared using a different program".

Table 32. Relationships between PNI scores and student demographic variables of status, level of education, degree sought and microcomputer ownership[a]

Skills	Characteristics			
	Status	Education	Degree sought	Micro ownership
Give instructions to combine...	.02	.09	.05	.30
Access and retrieve information...via modem	.03	.32	.32	.23
Transfer and receive files..	.23	.15	.21	.27
Use a programming language..	.13	.25	.29	.13
Hook up the computer to communicate with other...	.13	.17	.20	.22
Create overheads..	.21	.19	.17	.18
Use computer assisted...	.34	.08	.18	.30
Transmit and receive messages via electronic mail system..	.21	.41	.43	.12
Interpret computer error...	.22	.34	.26	.19
Use data management program	.13	.20	.30	.19
Perform financial analyses	.07	.13	.28	.42
Perform advanced statistical..	.14	.30	.42	.46
Search computer databases...	.25	.34	.34	.28

[a] Cramer's V correlation coefficients

Pearson correlation coefficients were computed to determine the nature and extent of the relationships between the students' demographic variables of age, years of working experience, microcomputer experience, length of enrollment in the United States, and PNI scores on the perceived microcomputer education needs (Table 33). As shown in Table 33, the results of the correlation coefficients indicate that "negligible" to "low" positive relationships exist

between age, working experience, and skill. Exceptions found were that "negligible" to "low" negative relationships exist between age, and working experience, and the following skills: "Use a programming language to create a software program"; "Transmit and receive messages via an electronic mail system"; "Interpret computer error messages that identify common operational problems and correct such problems"; and "Use computer assisted instructional programs". On the other hand, "negligible" to "moderate" negative relationships exist between the demographic variables of microcomputer experience, length of enrollment in the United States and PNI scores of the skills. The coefficients ranged from a low of 0.00 to a high of [-.38]. The highest coefficient exists between the variable of microcomputer experience and one specific skill: "Access and retreive information from commercially available computer networks/databases via computer and modem". Another skill that had a moderate relationship with the variable of microcomputer experience was " Perform advanced statistical analyses". Besides, the variable length of enrollment in the United States, also had a moderate relationship with the following skill: "Transmit and receive messages via an electronic mail system".

Table 33. Relationships between PNI scores and students demographic variables of age, working experience, microcomputer experience, and length of enrollment in the USA[a]

Skills	Characteristics			
	Age	Work experience	Micro experience	Length of enrollment
Give instructions to comp...	.09	.13	-.15	-.04
Access and retrieve information...via modem	.09	.13	-.38	-.28
Transfer and receive files...	.13	.21	.05	-.10
Use a programming ...	-.14	-.06	-.08	-.22
Hook up the computer to communicate with other....	.05	.20	-.20	-.27
Create overheads..	.00	.03	-.22	-.22
Use computer assisted...	-.06	-.04	-.09	-.15
Transmit and receive messages via electronic mail..	-.06	.05	-.22	-.32
Interpret computer error...	.03	-.06	-.15	-.11
Use data management program	.07	.17	-.28	-.25
Perform financial analyses	.17	.17	-.06	-.24
Perform advanced stat....	.03	.10	-.32	-.20
Search computer databases...	.07	.08	-.22	-.23

[a] Pearson correlation coefficients

CHAPTER V

Summary, conclusions, and recommendations

This chapter contains four sections and begins with a summary presentation of the main points of the preceding chapters, including the findings. The second part of this chapter contains the conclusions that were developed from the major findings. The third section contains implications for action generated from the major findings and conclusions. The last section, recommendations, suggests practical applications of the findings of this study and areas of future study identified as important for further contribute to the purpose of this study.

Summary

The purpose of the study was to determine the computer education needs of selected Indonesian students who were graduate students (1) enrolled at agriculturally related departments in the United States, (2) sponsored by MUCIA located in Columbus, Ohio.

To accomplish the purpose of the study the following objectives were identified:

1. To describe the demographic characteristics of Indonesian students in terms of their gender, age, occupation, previous computer experience,length of study in the United States, field of study, and highest academic degree held.
2. To determine the importance of microcomputer competency as perceived by the Indonesian students enrolled at agriculturally related departments in the United States.
3. To identify the perceived level of microcomputer competency possessed by Indonesian students enrolled at agriculturally related departments in the United States.
4. To determine the perceived level of microcomputer competency needed by Indonesian students enrolled at agriculturally related departments in the United States.
5. To determine if differences in educational needs exist relative to the demographic variables of gender, age, status, level of education prior to enrolling at agriculturally related departments in the United States, degree sought, microcomputer ownership, length of time of microcomputer

ownership, working experience, and length of stay in the United States.

6. To determine the relationship between the demographic characteristics of the Indonesian students and their perceptions of computer education needs.

Eighty questionnaires were distributed to the subjects of the study. From this target population, it was learned that four students had since returned to Indonesia, resulting in an accessible population of seventy-six.

The questionnaire was adapted from a previously validated instrument. The instrument had been administered at East Texas State University by Rogers (1987) and at West Virginia University by Ellis (1990). A panel of experts from Michigan State University's Department of Agricultural and Extension Education was used to examine and ascertain the adapted instrument's content validity. This instrument was pilot tested for reliability and the Cronbach's alpha estimates for all categories and subcategories of competency statements were within the range of .77 to .98.

The questionnaire was sent to the study participants on July 1, 1991. Thirty-nine returned the completed questionnaire prior to July 15, 1991, and 24 students responded after July 15, 1991. A postcard followup was sent one week after the questionnaire was first mailed, and then the second letters with the questionnaires were mailed to

the non-respondents three weeks after the first mailing. Characteristics of the late respondents were compared to those of the early respondents and the results of the T-test analysis showed that characteristics between early and late respondents were not significantly different.

Sixty-three Indonesian graduate students who were studying agriculturally related disciplines at twenty-eight universities in twenty-four states in the Unites States responded, for a total respondent rate of 83 percent.

The first objective of the study was to describe the demographic characteristics of the Indonesian students. Findings showed that more than 90 percent of the research subjects who responded to the study questionnaire were between 27 and 45 years old. Three-fourths of the respondents were male. A majority of the respondents were married and held a bachelor's degrees. More than 90 percent of the study participants held previous degrees in agriculturally related areas.

Most respondents had worked more than five years prior to enrolling in agriculturally related departments in the United States. However, less than 10 percent had more than five years of experience with microcomputers while working Indonesia. A majority of the participants indicated that working with microcomputers was a relatively new experience for them. Lack of time, and lack of facilities were the main barriers that kept these students from learning more about

microcomputers. These findings were consistent with those of Ellis et al. (1990), who reported that most international students in college are beginners or non-users of microcomputers.

About half of the study participants owned microcomputers. However, most of them owned them for less than one year. The most common application was that of word processing, but there was also a wide range of other applications, such as spreadsheets, databases, statistical analysis, and programming language. This is also consistent with the findings of Ellis et al. (1990), and Hirscheim et al. (1990). A vast majority of the students felt they would have access to microcomputers when they returned to Indonesia. This finding illustrates the need for further education in the use of microcomputers.

The second objective of this study determined the importance of microcomputer competency as perceived by Indonesian students enrolled at agriculturally related departments in the United States. The mean importance score of the statements ranged from 2.46 to 3.57 with the overall mean of 3.18 and standard deviation of .44. The mean importance score of the microcomputer skills pertaining to the categories of general, word processing, spreadsheets, databases, and other were 3.31, 3.25, 3.33, 2.75, and 3.03, respectively, with the standard deviation of .44, .50, .46, .75, and .61, respectively as well. The statements receiving

the highest importance scores pertaining to the category of general were: "Prepare (format) a floppy diskette for use"; "Retrieve (load) previously stored computer activities for completion and/or update"; and "Make appropriate backups or copies of files, programs, and data as required". The highest importance mean scores pertaining to the category of word processing were: "Use a word processing program"; and "Create and edit long documents such as reports or manuscripts", whereas the highest importance mean score pertaining to the category of spreadsheets was: "Use a statistical analysis program".

The third objective was to identify the perceived ability levels of microcomputer competency possessed by the study participants. The average ability scores of the statements ranged from 1.67 to 3.40 with standard deviations of .72 and .66. In this study, most students felt that their abilities to perform microcomputer tasks were lower than their perceptions of the importance of each microcomputer skill. Skills receiving lower than "low ability" scores were those associated with databases and other, such as "Generate mailing labels"; "Hook up the microcomputer to communicate with other computers"; "Transmit and receive messages via an electronic mail system"; "Access and retrieve information from commercially available computer networks/databases via computer and modem"; "Give instruction to a computer to combine files prepared using one program with files prepared

using a different program (e.g., a spreadsheet file with a word processing file)"; "Use a programming language to create a software program"; and " Use computer instructional programs". Skills receiving higher ability scores were those associated with the general and word processing categories. This finding related to a previous study conducted by Ellis et al. (1990) with international students at West Virginia University in that skills receiving the highest ability scores were those that would be used most frequently with normal microcomputer use.

The fourth objective of this study determined the perceived microcomputer competency needed by Indonesian students enrolled at agriculturally related departments in the United States. The average PNI score ranged from .43 to 3.76 with the overall mean of 1.91 and standard deviation of 2.22. Of the seven statements reported as having the highest importance scores, none of them were included as microcomputer education needs of the participants. On the other hand, of the seven skills reported as having the lowest ability scores, six were included in the skills receiving the highest PNI scores. This indicates that, eventhough the students perceived certain skills as "very important," it was not necessary for those particular skills to become standard microcomputer education needs.

Microcomputer skills having the greatest education needs were: "Interpret computer error messages that identify

common operational problems and correct such problems"; "Hook up the microcomputer to communicate with other computers"; "Transmit and receive messages via an electronic mail system"; "Access and retrieve information from commercially available computer networks/databases via computer and modem"; "Give instructions to a computer to combine files prepared using one program with files prepared using a different program (e.g., a spreadsheet file with a word processing file)"; "Use a programming language to create a software program"; and "Use computer assisted instructional programs". Other skills, such as "Perform advanced statistical analyses"; "Perform financial analyses"; "Use a data management program"; "Search computer databases related to my field"; "Transfer and receive files from other computers"; and "Create overheads to use in instructional or professional presentations", were also considered as microcomputer education needs of the participants, as the mean scores of those skills were relatively high.

The fifth objective of this study determined if the study participants had different perceptions of microcomputer education needs when examined in relation to their demographic information. T-tests were performed to see if gender, age, status, level of education, degree sought, microcomputer ownership, and microcomputer experience, affected the perceptions of each skill reportedly receiving

the greatest education needs.

No significant differences were observed between the two groups who differed in gender and age for these skills. In other words, all participants, whether male or female, and who ranged in age between 25 and 35, or older than 35 years of age, did not have different perceptions of microcomputer education needs. Married participants were found to have different PNI scores from those of single participants for one specific skill:"Search computer databases related to my field". This means that the married participants had greater education needs in searching computer databases related to their fields, than did the single students, and the difference was significant at the .05 level. No clear evidence was found in the literature to suggest that this was the norm. Gerver (1984) indicated that microcomputers iuse n adult learning was geared to help adults deal with microcomputers, making them more equal with children in terms of computer literacy, as their children had been involved with using microcomputers extensively. For this reason, married participants were encouraged by their children to work with microcomputers.

In addition to that, the study participants had different educational needs when examined in relation to their levels of education prior to coming to the United States. Findings showed that students with bachelor's degrees had higher PNI scores than those with master's

degrees for the following specific skills:"Perform advanced statistical analyses"; "Search computer databases related to my field"; and "Transmit and receive messages via an electronic mail system". In other words, students with bachelor's degrees had greater education needs for these skills than did students with master's degrees.

Master's students had significantly different perceptions of microcomputer education needs than did PhD students. This means that the students pursuing master's degrees had significantly greater education needs than the PhD students for the following skills: " Perform advanced statistical analyses"; "Use a data management program"; "Search computer databases related to my field"; "Transmit and receive messages via an electronic mail system"; and "Use a programming language to create a software program."

Students who did not own microcomputers had higher PNI scores than those who owned them in the following skills: "Perform advanced statistical analyses"; "Perform financial analyses"; "Search computer databases"; and "Give instructions to a computer to combine files prepared using one program with files prepared using a different program (e.g., a spreadsheet file with a word processing file)"; the differences were statistically significant at the .05 level. In other words, students who did not own microcomputers had higher education needs for these skills than did students who owned microcomputers.

No significant differences were found in the PNI scores (at the .05 level) between two groups of students who owned microcomputer for lengths of time. Similarly, no significant differences were found in the PNI scores between two groups who had differing microcomputer experience. All of the study participants, whether having used microcomputers while working or not, did not have different perceptions of microcomputer education needs.

One-way analysis of variance and B-Tukey procedures were used to examine differences in microcomputer educational needs in terms of years of working experience prior to enrolling at agriculturally related departments in the United States, length of stay in the USA, and field of study. No significant differences at the .05 level were found among Indonesian students who had different working experiences, and different length of stay in the United States. On the other hand, students had different educational needs for one specific skill when examined in relation to their fields of study. Students in the fields of animal science, environmental science, fisheries, and forestry had higher PNI scores, than did students in the fields of agricultural economics, agricultural extension and eduacation, agricultural engineering and resource economics, for the following microcomputer skill: "Use a data management program". The difference among the students enrolled in different fields of study could be attributed to

the nature of their disciplines. Ellis et al. (1990), found that students in the fields of animal science, and plant and soil science, had the greatest education needs. No significant differences were observed between fields of study and other microcomputer education needs.

T-tests were performed to see if Indonesian students had different educational needs when examined in relation to their application of microcomputers. Findings showed that significant differences at the .05 level were observed among the study participants who used different microcomputer applications for some specific skills: "Perform financial analyses"; "Use a data management program"; Create overheads to use in instructional or professional presentations"; and "Access and retrieve information from commercially available computer networks/databases via computer and modem." In other words, students who mainly used word processing and/or spreadsheets perceived higher microcomputer education needs for these skills than did students who had used not only word processing and spreadsheets, but also other application programs such as databases, statistics, and programming language.

The sixth objective of this study was geared to find out the relationships between the demographic characteristics of the Indonesian students and their perceptions of microcomputer education needs. The extent and nature of the relationships were measured based on Davis'

description. Cramer's V correlation coefficients were computed to determine the relationships between status, level of education, degree sought, microcomputer ownership, and microcomputer education needs. Correlation coefficients indicated that "negligible" and "low" positive relationships exist between status and the students' PNI scores; "negligible" to "moderate" positive relationships exist between education, degree sought, and the students' PNI scores. In other words, married students tend to be associated with greater need for microcomputer skills than single students. Similarly, students with master's degrees, tend to be associated with greater microcomputer education needs than students with bachelor's degrees. On the other hand, "low" and "moderate" positive relationships were found between microcomputer ownership and the students' PNI score. This means that the students who owned microcomputers tend to be associated with greater need for microcomputer skills.

Pearson correlation coefficients were computed to determine the nature and extent of the relationships between the students' demographic variables of age, working experience, microcomputer experience, length of enrollment in the United States, and the students' PNI scores. "Negligible" and "low" positive relationships were found between the variables of age, years of working experience, and some of the students' PNI scores. An exception found was that "negligible" and "low" negative association exist with

the following microcomputer skills: "Use a programming language to create a software program", and "Use computer assisted instructional programs".

Negative relationships were found between the variables of years of microcomputer experience, length of enrollment in the United States, and the students' PNI scores. The association ranged from negligible [r=-.04] to moderate [r=-.40]. In other words, students with limited microcomputer experience, and shorter length of stay in the United States tend to be associated with greater microcomputer education needs.

Conclusions

Most Indonesian students had worked more than five years prior to enrolling in agriculturally related departments in the United States. While most students had used microcomputers prior to enrollment, less than ten percent had more than five years experience with microcomputers while working in Indonesia. A majority of the respondents indicated that working with microcomputers was a relatively new experience. Lack of time, and lack of facilities were the main barriers that kept them from learning more about microcomputers. While the most common application was that of word processing, there were also a wide range of other applications, such as spreadsheets, databases, statistical analyses and programming language.

A majority of the Indonesian students viewed the microcomputer skills as "important" and "very important". The mean importance scores of the statements pertaining to the categories of general (3.31), word processing (3.25), and spreadsheets (3.33) and the mean importance scores of the skills pertaining to the categories of databases (2.75) and other (3.03) (for Indonesian students on a 1 - 4 scale), indicate that students perceived of higher importance, being able to perform microcomputer skills pertaining to the general, word processing and spreadsheets categories than the databases and other categories.

Most students felt that their abilities to perform skills were lower than their perceptions of the importance of each microcomputer skill. Skills receiving lower than "low ability" scores were those associated with databases and others. Skills receiving higher ability scores were those used most frequently with normal computer use. These microcomputer skills were associated with general, word processing and spreadsheets categories. The mean ability scores of the microcomputer skills pertaining to the categories of general, word processing, spreadsheets, databases and other were 2.95, 2.80, 2.63, 2.14 and 1.92, respectively, on a 1 - 4 scale. These findings indicate that students perceived they had greater ability in performing the microcomputer skills pertaining to the categories of general, word processing, and spreadsheets, than the

databases and other categories.

Mean importance scores for the categories of general, word processing, spreadsheets, databases, and other were 3.31, 3.25, 3.33, 2.75, and 3.03, respectively, and mean ability scores for each category were 2.95, 2.80, 2.63, 2.14, and 1.92, respectively, suggesting that the majority of study participants rated the importance of being able to perform microcomputer skills higher than their ability to perform those skills. The difference between perceived importance and perceived ability shows educational need for each microcomputer skill. In this study, the microcomputer skills having the greatest education needs were associated with the categories of general, spreadsheets, and other. Of the seven statements reported as having the highest importance scores, none of them were included as important microcomputer education needs of the participants. However, of the seven skills reported as having the lowest ability scores, six were included in the skills that received the highest PNI scores. This indicates that, eventhough the study participants perceived certain skills as being "very important", it was not necessary for them to become standard microcomputer education needs.

No significant differences were observed between two groups of students who differed in gender and age regarding microcomputer education needs. An exception was that married participants had greater education needs than single

students in one specific skill: "Searching computer databases related to my field". Similarly, students with bachelors' degrees had greater education needs for some skills such as "Perform advanced statistical analysis", "Search computer databases related to my fields", and "Transmit and receive messages via an electronic mail system", than those students with master's degrees. Students pursuing master's degrees had significantly greater education needs than PhD students for the following skills: " Perform advanced statistical analyses"; "Use a data management program"; "Search computer databases related to my field"; "Transmit and receive messages via an electronic mail system"; and "Use a programming language to create a software program." Furthermore, students who did not own microcomputers had significantly greater education needs than those students who owned microcomputers, for the following skills: "Perform advanced statistical analyses"; "Perform financial analyses"; "Search computer databases"; and "Give instructions to a computer to combine files prepared using one program with files prepared using a different program (e.g., a spreadsheet file with a word processing file)."

No significant differences in educational needs existed between the demographic variables, length of time of microcomputer ownership, and microcomputer experience while working in Indonesia. The reason for this could be

attributed to the backgrounds of the participants. It was noted that many of the students had limited experience with microcomputers, and that the lack of time and facilities were also factors that kept them from learning more about microcomputers. Similarly, no significant difference existed in microcomputer educational needs regarding the demographic variable of length of enrollment in the United States. All the respondents, whether having stayed in the United States for less than one year or more, did not hold different perceptions in terms of microcomputer education needs.

Students in the fields of animal science, environmental science, fisheries, and forestry had higher microcomputer education needs than students in the fields of agricultural economics, agricultural engineering and resource economics, and agricultural extension and education, with respect to the following microcomputer skill: "Use a data management program". The difference between these two groups of students could be attributed to the nature of their disciplines. No significant differences were observed among students enrolled in different fields of study for other microcomputer skills.

Students who mainly used word processing and spreadsheet programs perceived higher microcomputer education needs than did students who had used not only word processing and spreadsheets, but also other application

programs, such as databases, statistics, and programming language.

Students who owned microcomputers tend to be associated with greater education needs for microcomputer skills, than students who did not own microcomputers at home. Similarly, students with master's degrees and students pursuing PhD degreees tend to be associated with greater need for microcomputer skills, as well. Furthermore, students with limited microcomputer experience, and shorter length of stay in the United States also tend to be associated with greater microcomputer education needs.

Implications

The findings indicate that no differences existed between the students' years of microcomputer ownership and length of working experience in relation to their experience with microcomputers before coming to the United States. It should be remembered that a great majority of the respondents indicated that they had limited microcomputer experience prior to enrolling at agriculturally related departments in the United States. This finding illustrates the need for further education in the use of microcomputers. A range of different types of informative technology courses should be available to students, including basic introduction courses to the application of microcomputers in general, as well as some particular packages related to

their fields of study.

All of the respondents held at least a baccalaureate degree. This implies that the study participants will continue to be more knowledgeable about, and perceive higher microcomputer education needs. Main constraints, such as the lack of time and lack of facilities, need to be overcome in order to provide basic awareness of microcomputers to Indonesian students.

The findings indicate that most students felt their abilities to perform skills as lower than their perceptions of the importance of each microcomputer skill. Therefore, the implication exists that the difference between perceived importance and perceived ability reveals an educational need for each microcomputer skill.

This study concludes that students who own microcomputers tend to be associated with higher needs for microcomputer skills. It also concludes that students with master's degrees, limited microcomputer experience, and less than one year of stay in the United States tend to be associated with higher needs for selected microcomputer skills. Adequate facilities and computer training seem appropriate to support their microcomputer education needs.

Recommendations

The following recommendations are based on the results of this study.

1. This study should be administered to all Indonesian students enrolled at agriculturally related departments in the United States to provide further information pertaining to microcomputer education needs of all Indonesian students.
2. A range of different types of information technology courses should be provided to all levels of expertise, including basic introduction courses about the application of microcomputers in general, as well as some software packages related to the particular fields of study of the students.
3. Better access to microcomputers and other related facilities, including software packages, should be provided.
4. Microcomputer education leading to competency acquisition in the areas associated with general and other categories, should be given the highest priority; spreadsheets and databases should be given next priority.

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APPENDIX A
QUESTIONNAIRE AND SURVEY MATERIALS

Cover letter to the Survey Questionnaire

Agricultural & Extension Education
Michigan State University
410 Agriculture Hall
East Lansing, Michigan 48824 - 1039
(517) 355 - 6580

July 1, 1991

NAME
ADDRESS
CITY, STATE AND ZIP

Microcomputer technology is increasingly recognized as a means to increase management efficiency and profitability in agriculturally related fields in Indonesia. With the increased emphasis on computerized decision making, there is a need for adequate skill development to use microcomputers appropriately. However, no one really knows how Indonesian graduate students like yourself perceive microcomputer education needs. Your opinion is very important.

This study examines computer software used by Indonesian students and their preferences about computer programs. It has the potential to identify appropriate training activities for Indonesian students in microcomputer use and application in agriculturally related fields in the future.

By taking a few minutes to fill out the questionnaire, you will be helping us to identify these current needs and what may be required in the future. Your participation will greatly contribute to the completion of this study.

You may be assured of complete confidentiality. The questionnaire has an identification number for mailing purposes only. Your name will never be placed on the questionnaire. Your participation is completely voluntary.

Your prompt reply in returning the enclosed form prior to July 15, 1991 will be appreciated. A postage paid return envelope is enclosed for your convenience.

Thank you for your time and cooperation.

Sincerely,

Ignasius Sebayang

Survey of Indonesian Graduate Students' Perception About Microcomputer Education Needs

Background:

Microcomputers are playing an increasingly important role in the management of agricultural and forestry resources in Indonesia. Professionals in agriculturally related discipline should be prepared to use microcomputers for improving the utilization of these resources. Therefore, attention should be paid to Indonesian graduate students'perception of their microcomputing education needs.

Purpose:

In order to prepare individuals with appropriate microcomputer competencies, the Department of Agricultural & Extension Education, College Of Agriculture and Natural Resources, Michigan State University requests that you complete this questionnaire.

Directions:

Answer each question as accurately as you can. Many questions can be answered by encircling the item that best describes your opinion or situation. All answers will be kept completely confidential.

Example :

Your Perception on The Importance of Each Microcomputer Skill	Your Level of Ability for Each Microcomputer Skill
NI - Not Important	NA - No Ability
SI - Slightly Important	LA - Low Ability
I - Important	MA - Moderate Ability
VI - Very Important	HA - High Ability

NI SI MI VI 1. Load programs into the computer. NA LA MA HA

Therefore this indicates that the respondent feels it is very important (VI) to be able to load programs, but the respondent has a low ability (LA) in this area.

Part I

The following questions deal with your perception on the importance level and ability level for each microcomputer skill. Please circle the responses that best reflects your answer.

Your Perception on The Importance of Each Microcomputer Skill		Your Level of Ability for Each Microcomputer Skill	
Response	Key	Response	Key
Not Important.....	NI	No Ability.....	NA
Slightly Important.....	SI	Low Ability.....	LA
Important.....	I	Moderate Ability	MA
Very Important	VI	High Ability	HA

A - General Information

Level of Importance (Circle One)		Level of Ability (Circle One)
NI SI I VI	1. Evaluate computer software in my discipline.	NA LA MA HA
NI SI I VI	2. Evaluate computer hardware in my discipline.	NA LA MA HA
NI SI I VI	3. Complete routine connections between computers and peripheral equipment such as printers, monitors, modems etc.	NA LA MA HA
NI SI I VI	4. Set up and place the microcomputer into operation.	NA LA MA HA
NI SI I VI	5. Load programs into the computer.	NA LA MA HA
NI SI I VI	6. Prepare (format) a floppy diskette for use.	NA LA MA HA
NI SI I VI	7. Transfer files from one disk to another.	NA LA MA HA
NI SI I VI	8. Interpret computer error messages that identify common operational problems and correct such problems.	NA LA MA HA
NI SI I VI	9. Store (save) incomplete microcomputer activities for completion at a later time.	NA LA MA HA

Your Perception on The Importance of Each Microcomputer Skill		Your Level of Ability for Each Microcomputer Skill	
Response	Key	Response	Key
Not Important.....	NI	No Ability.....	NA
Slightly Important.....	SI	Low Ability.....	LA
Important.....	I	Moderate Ability	MA
Very Important.....	VI	High Ability	HA

A - General Information (Continued)

Level of Importance (Circle One)		Level of Ability (Circle One)
NI SI I VI	10. Retrieve (load) previously stored computer activities for completion and/or update	NA LA MA HA
NI SI I VI	11. Make appropriate backups or copies of files, programs, and data as required.	NA LA MA HA
NI SI I VI	12. Assist in personal tasks and scheduling (e.g., calendar, to do list, etc.).	NA LA MA HA
B - Word Processing		
Level of Importance (Circle One)		Level of Ability (Circle One)
NI SI I VI	1. Use a word processing program.	NA LA MA HA
NI SI I VI	2. Create bibliographies that can be easily updated or automatically converted to different style format.	NA LA MA HA
NI SI I VI	3. Create and edit long documents such as a report or manuscript.	NA LA MA HA
NI SI I VI	4. Create and edit technical or scientific documents.	NA LA MA HA
NI SI I VI	5. Generate outlines that can be quickly collapsed or expanded for use in such things as speeches or presentations.	NA LA MA HA

Your Perception on The Importance of Each Microcomputer Skill		Your Level of Ability for Each Microcomputer Skill	
Response	**Key**	**Response**	**Key**
Not Important	NI	No Ability	NA
Slightly Important	SI	Low Ability	LA
Important	I	Moderate Ability	MA
Very Important	VI	High Ability	HA

B - Word Processing (Continued)

Level of Importance (Circle One)		Level of Ability (Circle One)
NI SI I VI	6. Integrate data into personalized letters (e.g., reports, lab assignments, etc.)	NA LA MA HA
NI SI I VI	7. Check documents for typographical, spelling,and minor grammatical errors.	NA LA MA HA
NI SI I VI	8. Create and edit instructional materials (e.g., course syllabus, tests, etc.).	NA LA MA HA
NI SI I VI	9. Collect and retrieve notes.	NA LA MA HA
NI SI I VI	10. Create form letters which can be personalized and merged with a mailing list.	NA LA MA HA
NI SI I VI	11. Create, edit, and produce a short documents such as memos or letters.	NA LA MA HA
C - Spreadsheets/Statistics		
Level of Importance (Circle One)		Level of Ability (Circle One)
NI SI I VI	1. Use a spreadsheet program.	NA LA MA HA
NI SI I VI	2. Use a statistical analysis program.	NA LA MA HA

Your Perception on The Importance of Each Microcomputer Skill		Your Level of Ability for Each Microcomputer Skill	
Response	Key	Response	Key
Not Important.....	NI	No Ability.....	NA
Slightly Important.....	SI	Low Ability.....	LA
Important.....	I	Moderate Ability	MA
Very Important.....	VI	High Ability	HA

C - Spreadsheets/Statistics (Continued)

Level of Importance (Circle One)		Level of Ability (Circle One)
NI SI I VI	3. Create graphs, charts and diagrams.	NA LA MA HA
NI SI I VI	4. Develop budgets for projects or lab assignments so as to explore "what if" alternatives.	NA LA MA HA
NI SI I VI	5. Perform mathematical calculations.	NA LA MA HA
NI SI I VI	6. Perform advanced statistical analyses	NA LA MA HA
NI SI I VI	7. Perform financial analyses.	NA LA MA HA
D - Data Base		
Level of Importance (Circle One)		Level of Ability (Circle One)
NI SI I VI	1. Use a data management program	NA LA MA HA
NI SI I VI	2. Search computer databases related to my field.	NA LA MA HA
NI SI I VI	3. Generate mailing lists.	NA LA MA HA
NI SI I VI	4. Generate mailing labels.	NA LA MA HA
NI SI I VI	5. Generate directories of telephone numbers, names, ages, etc.	NA LA MA HA

Your Perception on The Importance of Each Microcomputer Skill		Your Level of Ability for Each Microcomputer Skill	
Response	**Key**	**Response**	**Key**
Not Important.....	NI	No Ability.....	NA
Slightly Important.....	SI	Low Ability.....	LA
Important.....	I	Moderate Ability	MA
Very Important.....	VI	High Ability	HA

E - Other

Level of Importance (Circle One)		Level of Ability (Circle One)
NI SI I VI	1. Transfer and receive files from other computers.	NA LA MA HA
NI SI I VI	2. Create overheads to use in instructional or professional presentations.	NA LA MA HA
NI SI I VI	3. Hook up the microcomputer to communicate with other computers.	NA LA MA HA
NI SI I VI	4. Transmit and receive messages via an electronic mail system.	NA LA MA HA
NI SI I VI	5. Access and retrieve information from commercially available computer networks/databases via computer and modem.	NA LA MA HA
NI SI I VI	6. Give instructions to a computer that will combine files prepared using one program with files prepared using a different program (e.g., a spreadsheet file with a word processing file).	NA LA MA HA
NI SI I VI	7. Use a programming language to create a software program.	NA LA MA HA
NI SI I VI	8. Use computer assisted instructional programs.	NA LA MA HA

Part II - Demographic Information

1. What is your gender? (Circle number)

1 FEMALE
2 MALE

2. What is your age? _____ YEARS

3. What is your current marital status? (Circle number)

1 NEVER MARRIED
2 MARRIED
3 DIVORCED
4 WIDOWED

4. Do you have any children? (Circle number)

1 NO
2 YES

If not, skip to question #6

5. If you have children, how many? _____

6. What is your highest level of education prior to study in USA? (Circle number)

1 BS (Sarjana). specify major _____

2 MS (Pasca Sarjana). specify major _____

7. Did you use microcomputers in your study in Indonesia?

1 NO
2 YES

If not, skip to question #9

8. In which level of education did you first learn how to use microcomputer ? (Circle number)

1 ELEMENTARY SCHOOL
2 JUNIOR HIGH SCHOOL
3 HIGH SCHOOL
4 COLLEGE

9. How long have you worked prior to coming to the USA? _____ (YEARS)

10. Did you use microcomputers in your work in Indonesia? (Circle number)

1 NO
2 YES

If not, skip to question #13

11. How long had you used computers? _____ (YEARS)

12. What kind of computer software did you use frequently?

_____

13. What is your major field of study? _____

_____

14. How long have you been in the USA? _____ (YEARS)

15. Degree you are pursuing. (Circle number)

1. MASTER
2. PHD
3. OTHER... (specify) _____

16. Do you own a microcomputer?

1 NO
2 YES

If not, skip to question #19

17. How long have you owned the microcomputer? _____ YEARS

18. How do you rate your ability to use microcomputers? (Circle number)

1. NO ABILITY
2. LOW ABILITY
3. MODERATE ABILITY
4. HIGH ABILITY

19. Is there any barrier that keeps you from learning more about microcomputers? (Circle number)

    1. NO
    2. YES

    If not, skip to question # 21

20. What barriers keep you from learning more about microcomputer ? (Circle all that apply)

    1. LACK OF TIME
    2. LACK OF INTEREST
    3. LACK OF FACILITIES
    4. OTHER ...(SPECIFY) _____

21. Do you have access to microcomputer when you return to Indonesia? (Circle number)

    1. NO
    2. YES

22. Is there anything else you would like to comment? If so, please use this space for that purpose.

FOLLOW-UP POSTCARD

July 11, 1991

Last week you were mailed a questionnaire seeking your opinion about microcomputer education needs. Your name was drawn in a list of selected Indonesian students who enrolled at agriculturally related departments in United States.

If you have already completed and returned it to us please accept our sincere thanks. If not, please do so today. Because it has been sent to only a small number of Indonesian students it is extremely important that the results will be more representative if we can include your opinions.

If by some chance you did not receive the questionnaire, please call me at (517)355-3022 and I will get another one in the mail to you today.

Sincerely,

Ignasius Sebayang

FOLLOW-UP LETTER

Agricultural & Extension Education
Michigan State University
410 Agriculture Hall
East Lansing, Michigan 48824 - 1039
(517) 355 - 6580

July 26, 1991

NAME
ADDRESS
CITY AND ZIP

About three weeks ago you were mailed a questionnaire designed to obtain information from Indonesian Graduate Students enrolled at agriculturally related departments in United States. Because you are one of a small group that was drawn in this study, we truly need your response.

As of today we have not yet received your completed questionnaire. We are depending on your assistance. Your answers will help us to identify appropriate training activities for Indonesian students in microcomputer use and application in agriculturally related fields in the future. The results will be more representative if we can include your opinions. Your answers will be kept in strict confidence. They will not be tabulated individually, but will be grouped with those of other respondents.

If you have already completed and returned it, please disregard this letter and accept our appreciation. If not, would you please to take a few minutes to complete and return it? Should you have any questions or comments, please call me at (517)355-3022.

Your cooperation is greatly appreciated.

Cordially,

Ignasius Sebayang

APPENDIX B
INSTRUMENT RELIABILITY COEFFICIENTS

Table 34. Instrument Reliability Coefficients

	Chronbach's Alpha	
Sub Category	Level of Importance	Level of Ability
General	.9274	.8377
Word Processing	.8962	.7734
Spreadsheets	.9799	.8694
Data Base	.9132	.8975
Other	.9073	.8206

APPENDIX C
COMPARISON OF "EARLY" AND "LATE" RESPONDENTS

Table 35. Comparison of "early" and "late" respondents

Item	Early Respondents (n=39)	Late Respondents (n=24)	t-value[a]
Age	34.89	36.67	1.47
Gender	1.75	1.79	.43
Education	1.15	1.17	.13
Field	7.20	8.08	.75
Degree	1.18	1.38	1.75

[a] No significant difference between two groups at .05 level