AN ASSESSMENT OF COMPUTER AND MULTI-MEDIA SKILLS AMONG INTERNATIONAL GRADUATE STUDENTS IN AGRI-CULTURE AT OKLAHOMA STATE UNIVERSITY

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" It is He (Allah) who brought you forth from the womb of your mothers when you knew nothing and He gave you hearing and sight and intelligence: that you may give thanks (to Him for His bounties)"

Al-Qura'an (verses 16-78)

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This study is dedicated to Cameroon Oklahoma Uniting in Exchange for Recovery (COURAGE). This achievement came out of two tragedies that afflicted people of different race, community, economic opportunities, continent, experiences, education, and historical backgrounds. But they pursue the same goal in life, peace and happiness.

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CHAPTER I

Introduction

The United States of America continues to attract international students seeking high quality education and career opportunities both at the undergraduate and graduate levels. According to the Institute of International Education IIE report (1998), there were 481,280 foreign students enrolled in higher educational institutions in the United States for the 1997/98 academic year.

The United States is one of the most technologically advanced and affluent nations in the world. Many international students are attracted to the country because of its ethnic diversity, many higher education institutions, and flexible immigration laws. The high quality education and readily available access to teaching, research, and latest educational technologies play major roles in influencing foreign students to seek their education in the U.S. (Barnes, 1991).

One of the fastest growing and most promising components of education in the world today is the development of computer-based teaching programs known as multimedia which run on personal computers (PCs). These new technologies provide students and teachers access to materials as never before. Through condensed capabilities of computers, multimedia can deliver large amounts of information in such a way to make it manageable, efficient, effective, and most importantly useful to the users. Multimedia programs combine photographs, sound, and video as well as sizable text.

Therefore, multimedia programs in classrooms and research laboratories promises not only to change the type of information available for learning, but also the way learning takes place.

Rationale

Employers expect graduates from the College of Agriculture to have computer skills in frequently utilized areas such as word processing, spreadsheets, databases, and graphics according to Stegall, et al. (1999). Furthermore, most international graduate students in agriculture from developing countries return home and work in the field of agriculture upon graduation (Mumaw & Balakrishnan, 1992).

The acquisition and incorporation of electronic resources into classrooms, research centers, and experiment stations can be a daunting task. There is the hurdle of having access to the necessary technology and the use of the multimedia programs in education (Menn, 1993). Furthermore, the use of multimedia requires basic computer skills. This makes it imperative to ascertain how international graduate students in agriculture at Oklahoma State University (OSU) acquire and use computer and multimedia skills in their respective fields of study.

Statement of the Problem

Many of the foreign students who pursue their graduate degrees and earn diplomas at Oklahoma State University returned to their home countries and assumed leadership roles. It would be assumed they have acquired the necessary and appropriate

training in their field of concentration. Therefore, much would be expected of them in contributing to the economic and social development of their respective nations.

During the 1990s, there was an increased use of multimedia in all walks of life, while the information super highway (the Internet) has improved access to instant information in every corner of the globe. Where information was not readily available as in many third world countries, researchers, policy makers, extension staff, and in some cases agricultural producers can now access and obtain valuable information about agricultural production. However, international graduate students in agriculture at Oklahoma State University have the opportunity to acquire computer experience and develop the multimedia skills appropriate and necessary to assist them in carrying out leadership, educational and research responsibilities when they returned home.

Purpose of the Study

The purpose of this study was to determine the level of computer and multimedia skills as perceived by international students enrolled in agricultural graduate programs at Oklahoma State University.

Objectives

The following specific objectives were established to fulfill the purpose of the study.

1. To determine selected demographic characteristics of international graduate students in agriculture at Oklahoma State University.

2. To determine perceived computer skills among international graduate students in agriculture at Oklahoma State University.
3. To determine perceived multimedia skills among international graduate students at Oklahoma State University.
4. To determine the perceived learning effectiveness, usefulness and future importance of computer and multimedia skills to international graduate students in agriculture.
5. To determine relationships between certain demographic characteristics and selected computer and multimedia skills and their acquisition.

Scope of the Study

The scope of this study included international students enrolled in agricultural graduate programs at Oklahoma State University during the 1999/2000 academic year.

Assumption of the Study

The following assumptions were made regarding this study:

1. The respondents fully understood the questions they were asked.
2. The respondents provided honest and accurate expressions of their attitudes and perceptions about computer and multimedia skills.

Definition of Terms

IIE: International Institute of Education, which is a non-governmental organization that collects data on foreign students, studying in the US.

International/Foreign Student: One who is in the United States on a visa and is registered in an accredited institution.

High Skill Level: The use of basic personal computer applications as well as the ability to customize within each PC program.

Moderate Skill Level: The use of three or more basic personal computer programs which included Word processing, Spreadsheets, and Databases, little or no ability to customize files.

Low Skill Level: The use of one or two basic personal computer applications without the ability to customize files.

None or No Skill Level: A person who has no computer skills in any of the frequently used personal computer (PC) applications.

Significance of the Study

Oklahoma State University has received and trained many international students in all disciplines for many years. The University will continue to recruit foreign students in the future. With the shifting of traditional classroom teaching to electronic multimedia, there is a need to develop the skills of international graduate students who come to the University in pursuit of a quality education. This study identified both students who came with skills and expertise and those who could benefit from additional training. From the standpoint of academic advisement alone, this study will assist faculty in doing a more effective job in assisting those with specific needs to select appropriate course and

training activities. In addition, both faculty and administration could use the findings of this study to re-assess specific classes offered to international graduate students regarding computer techniques, programming, and systems software. International graduate students in agriculture have had the opportunity to express their attitudes and perceptions about computer and multimedia teaching and learning opportunities in their respective departments. The findings of this study should serve the interests of both the university and international graduate students.

CHAPTER II

Introduction

The purpose of this chapter was to present an overview of related literature that identified selected factors and pertinent skills in the professional development of international graduate students in agriculture. The presentation of the literature review was divided into five major areas and a summary to facilitate clarity and organization. The areas addressed were 1) Needs of Foreign Students; 2) Post Graduation Problems of International Students; 3) Computer Skills among Students in Agriculture; 4) Multimedia and the Internet; and 5) Computers and Multimedia Use in Agriculture.

Needs of Foreign Students

International students, who came to pursue their education in the United States, had both educational and social needs. Some of the major problems and needs included language difficulties, different educational systems from their home countries, adapting to a new culture, family oriented programs on campus for married students, transportation arrangements to shopping areas, school registration of children, accessibility of family and children to hospitals, and housing availability for families. Regarding language barriers, Kelly (1987) found that all foreign students admitted to US colleges and

universities passed the required Test of English as a Foreign Language (TOEFL). Though they fulfilled this requirement they were still faced with different regional accents and speech patterns of Americans.

From a European perspective, international students were not only confronted with the needs mentioned previously, but encountered academic problems with courses and training required in specific degree programs which applied to the needs of the host country's student body which had no practical application in the foreign student's home country. Juergensen (1987) reported this as a major problem which leads to the loss of interest among students in the academic training programs. A major among agricultural schools in the US, was the training provided foreign students at the doctoral level always appeared inappropriate. Students at this echelon were frequently trained for sophisticated research and teaching careers, while the expectation is for them to perform administrative and extension service duties when they returned to their home countries.

Over the years, higher education institutions in the US have developed programs tailored to the needs of foreign students. Regarding academic aspects, some colleges and universities offered courses in sophisticated English as a Second Language (SEL). This was done while minimizing the loss of time and resources on the part of the institutions. Furthermore, classes on Comparative Taxation were instituted to assist international students with English language skills. This provided added advantages for the schools to generate more revenue from course fees. At the graduate level, a master's degree in Comparative Law and International Business was introduced to diversify the academic curricula Craufurd et al. (1983) indicated this was done to provide additional enrichment

of academic programs for US students as well as to act as a service for students from developing countries.

University-based communities, civic service clubs, church organizations, volunteer groups, specialized offices, university departments, student organizations, collaborative programs and activities have been developed to assist foreign students during their stay in the US. University Housing Departments arranged for both single and married student housing. This department also provides family resource centers and organized family oriented programs. Free English language classes are frequently taught at these centers. Some universities arranged for weekend trips to the nearest grocery stores by bus for those students and families who have no means of transportation.

Post Graduation Problems of Foreign Students

International students also face great challenges of re-entry into their home countries. The first one often encountered seems to be professional integration or re-integration. Mumaw and Balakkrishnan (1992) documented that students in home economics and related disciplines had difficulties of being absorbed or re-absorbed into professional positions after they returned from the US. Mumaw and Balakkrishnan (1992) further identified professional development activities as factors that facilitated the re-integration process and maintenance of professional competency of those students after they returned home.

Foreign students who studied in the United States had become accustomed to numerous professional development opportunities as prospects for intellectual growth were widely available and easily accessible. This was in view for preparation of assuming

important positions in the development process of their home country. Many opportunities are afforded in expanding and updating their knowledge base in a bid to maintain their professional quality. However, the student's home country often does not afford the wide variety of opportunities to help the returning professional continue the momentum he or she started while abroad. As a result, many individuals from less developed countries experience isolation shortly after returning home. The possibility of getting professional interaction to update their professional competency many times becomes rather illusive. This often leads to professional decay. A solution to this problem would be building a professional network and communication system while in school. Establishing contacts with classmates, particularly those from the same region, studying in a similar field frequently provide assistance and encouragement.

Computer Skills among Students in Agriculture

In the decade of the 1990s, there has been an increase in the use of computers and computer run programs for teaching of students in U.S. colleges and universities. At the same time, students' learning styles have drastically shifted toward the use of computers and computer software programs designed for institutional purposes. The need to acquire computer skills and knowledge for using computer programs among students is also on the rise. Academic programs in universities and colleges have played an important role in accelerating the process of learning basic computer skills by students and teaching faculty through providing computers to faculty and computer laboratories for teaching and research. In colleges of agriculture, Bekkum and Miller (1994) found there was a consensus among educators and prospective industry employers regarding a genuine need

account their abilities to communicate their ideas effectively in written form according to Gleichsner and Jean (1994).

To emphasize the important role computer skill acquisition has played, some US universities have instituted a mandatory computer literacy requirement for graduation. Kazmer (1991) reported the University of Connecticut required all undergraduate students regardless of major to take at least one computer course prior to graduation.

Multimedia and the Internet

The increased utilization of technologies in education offer additional ways of enhancing the delivery of high quality instructional programs to students. McCaslin and Torre (1992), in their article, emphasized computers and telecommunications have inversely become the channels frequently used to present educational instruction to clientele in U.S. higher education.

Multimedia, meanwhile, is a multi-dimensional approach to today's growing campus in electronic based education. According to Marrison and Frick (1994), through the assistance of microcomputers, multimedia programs integrate text, animation, graphics, video, and audio. Specific multimedia programs have been developed for educational instructional purposes. Further development of multimedia has included the introduction of hypermedia. Liu (1994) described this informational presentation and representation system as having great advantages such as non-linearness, associableness, flexibility, and efficiency. With this new technology, learners are able to choose the manner in which to pursue learning content.

A noticeably fast growing aspect of today's educational environment is the development of computer-based teaching materials such as interactive multimedia programs developed for microcomputers. The new technologies present today provide teachers and students access to teaching and learning materials as never seen before Bass (1997). With expanded capabilities, computers can store condensed versions of large amounts of information making it manageable, approachable, and most importantly useful to users.

Interactive multimedia is synonymous to hypermedia. It has been referred to as "hybrid technology" according to Bass (1997). This technology combines the capabilities of storage and retrieval for computer databases with advanced tools for viewing and manipulating educational materials. This technology allows the user to choose and control materials of their choice for reading purposes.

The invention of personal computers (PCs) has accelerated the need and use of multimedia. The first presentation of multimedia application was the combination of audio and video in television (TV) programs. Heath (1996) indicated the technology advanced rapidly with microcomputers using sound cards, speakers, and interactive games. In addition, microcomputers have become the center for the advancement of this technology with the enclosure of digital audio and video by the use of sound cards and other devices such as CD-ROM and DVD drives. This facilitates communication on a wide range of channels. The connection of many computers to communicate with each other refers to a network while the transferring of information from one point to another is done through the use of telephone lines. The telephone plays a multi-faceted role in multimedia technology.

agriculture on the other hand, used interactive computer programs such as "Agland" for problem solving as additional or supplemental learning materials.

Computer learning could provide several ways of learning basic skills. Many older students have had not the best experience with learning and adopting new technology. The feelings of frustration, failure, and humiliation in the presence of younger undergraduate students could be reduced according to Askov and Turner (1989). Teaching and learning by computer offers privacy to adult learners as their teacher(s) can easily determine the skill level(s) attained. Therefore, students learn to work independently until they encounter difficulties, then turning to the teacher, for assistance.

The instructor could plan his or her lesson according to the needs of individual students while keeping the entire class in mind. This would accelerate the process of learning and increase individual student interest in the learning process. The use of technology in learning has shown gains in achievement by students according to Askov (1986). Acquisition of basic computer skills would gradually speed up the learning process by spending time practicing in the school's computer laboratories. Today's technology has dramatically changed the work place. Turkle (1984) stated "everyone must learn how to use computers and computer software at any level of employment". According to Strickland et al. (1989), learning computer skills helps individual students address both personal and employment-related matters.

Computer linteracy in today's educational climate serves a paramount role. Computer skills are pre-requisite for graduate students in documenting journal articles and developing writing skills. Student evaluations and critical review should take into

for computer skills and proficiency to be obtained by students majoring in agriculture before they graduate.

Basic computer skills include word processing, spreadsheets, databases, and graphics as the most essential. According to human resource managers in the agricultural industry, in order to be competitive regarding employment opportunities and efficiency in job performance, graduate students from colleges of agriculture must have computer competencies.

According to Donald et al. (1999), computers play an important role in agriculture. For this reason, university agricultural programs must make sure that graduate students acquire the necessary computer skills and knowledge before they complete their respective degree programs.

In nearly every aspect of agricultural business and industry, microcomputers are used. In education, Legacy et al. (1994) reported professors teaching in agricultural fields had started incorporating microcomputer software into their curricula. There have been remarkable increases in the use of computer hardware and software for educational purposes in agriculture.

Major progress has been made in computer technology. Personal computers (PCs) have become cheaper, their capabilities expanded, and software developed to address the needs of farmers, agribusiness managers, and other agriculturalists. Computers help in storing vast amounts of data, analyzing farm records, word processing, ration formulation for livestock and chemical applications just to name a few. Farmers also use computers to analyzed livestock and crop markets as well as planning marketing strategies. Students in

According to Hillman (1998), multimedia is a technology to educate, entertain, and inform. Technology through the use of computers has changed from communicating information in the form of text to story telling with the combination of pictures, sound, and video. These "high tech" systems offers user(s) the opportunity for fun, adventure, and interactive learning which is the driving force behind the popularity of personal computers today.

With the rapid expansion of multimedia, access to information has become faster and easier. Many universities have taken the advantage of the information age to provide useful and relevant information and data to students and the general public.Online education has become the newest and many ways an exciting opportunity for learning. Leshin (1996) described web site courses as learning opportunities offered to both traditional college students and long distance learners.

Newman et al. (1997) reported students who were taught using the world wide web (WWW) did better in technical writing classes than students taught using traditional classroom methods. Furthermore, students, taught online improved their attitudes toward writing, and the Internet, computer learning.

Computers and Multimedia Use in Agricultural Education

The introduction of computers into agricultural education instructional programs has changed the system of delivering information in teaching and learning. Miller and Connor (1997) stressed that teachers in agricultural education programs use computers in an integrated approach in which computers and other related technologies are combined to assist agricultural teachers and teacher educators to develop curriculum and prepare

teaching materials. Computer use and multimedia applications have been increasingly used in both agricultural and general educational settings.

To be competitive, agricultural teachers increasingly use computer applications to develop their curricula. Software also serves as an important link to rapidly changing technology. Langlinais (994) stated many university agricultural programs provide basic computer courses to students such as word processing, spreadsheets, databases, graphics, and communication applications.

The Texas Agricultural Extension Service introduced computers and software into county extension programs to teach adults financial planning and management. These included recordkeeping, consumer-buying skills, and budgeting. With computers, teaching became easier as learners practiced on the computers getting instant results. Through the use of computers the concepts of management were quickly according to Pienot (1988). In addition, England and Finely (1999) quoted Feldman, "Multimedia is the seamless integration of text, sound, and images of all kinds while control software is within a single digital information environment" (p1).

According to England et al. (1999) multimedia refers to both online and offline as well as other interactive media such as interactive video.

The Driving Force behind Computer Technology

The development of the Internet for civilian use has provided impetus to the rapid growth of multimedia programs. The Internet is a global connection of about 10 million computers with 45,000 network services that follow the Internet Protocol (IP). According to Hofstetter and Sine (1998), internet protocol was an invention of the United

States Department of Defense advanced Research Projects' Agency (ARPA) for military purposes. The Internet was organized into Internet services and defined by Internet Protocol which states in specific terms how information navigates across the net. Some of the Internet Protocol services include electronic mail listservs, news groups, chat rooms, File Transfer Protocol (FIP), telnet, Gopher, and the World Wide Web (WWW).

Hofstetter and Sine (1998) stated the World Wide Web (WWW) is a network of hypertext system which permits documents to be shared over the Internet. The world wide web was developed at the European Particle Physics Center (CERN) in Geneva, Switzerland. The purpose for the development of this network was to enable researchers to share documents electronically without having to travel from one country to another.

Summary

The review of literature has numerated the various needs of international students as well as the problems which they encountered. In addition, there were also the postgraduation problems when they returned to their various countries. Most interestingly were the computer and multimedia skills foreign students acquired and how they used those skills while in the United States compared to when they returned home. This study attempted to identify the ways and methods the international students learned and used computer and multimedia skills.

The literature review also examined the use of computers and computer programs in the field of agriculture as instructional tools to assist students and faculty in the teaching and learning. How the development of instructional multimedia applications were changing traditional teaching methods. Instructors have found new ways of

presenting information to their students more conveniently, rapidly, and in "living color". The use of computers and multimedia programs have provided new opportunities for teachers to upgrade and diversify subject matters, lessons, and integrate additional materials every semester without having to start from scratch. Students on the other hand learn materials presented to both visually and in audio form. This increases the interest in learning and makes information easier to retain than the way it was previously done.

The advent of the Internet has added a new dimension in the field agricultural education. Web based courses are being offered by many higher education institutions in the U.S. though teaching and learning are still challenging, however, fun has been integrated which gives instructors and students an additional tool. With the Internet technology, distance education has become more accessible to professional who have been yearning for growth in their fields. Higher education institutions are using the new technology in advertising and marketing their programs to prospective students and using it as a tool for recruiting new students both domestically and internationally.

CHAPTER III

Methodology

The purpose of this chapter was to describe the methods and procedures used to conduct the study. The primary purpose of this study was to determine the perceived level of computer and multimedia skills as indicated by international students enrolled in agricultural graduate programs at Oklahoma State University.

In order to accomplish the purpose it was necessary to determine a population and develop an instrument which would ascertain the information required to fulfill the study objectives. Procedures for data collection were established and methods of data analysis selected.

In order to accomplished the purpose of the study, the following objectives were established:

1. To determine selected demographic characteristics of international graduate students in agriculture at Oklahoma State University.
2. To determine perceived computer skills among international graduate students in agriculture at Oklahoma State University.
3. To determine perceived multimedia skills among international graduate students at Oklahoma State University.

4. To determine the perceived learning effectiveness, usefulness and future importance of computer and multimedia skills to international graduate students in agriculture
5. To determine relationships between certain demographic characteristics and selected computer and multimedia skills and their acquisition.

Population

The population of this study included 125 international graduate students in agriculture located in nine academic departments within the College of Agricultural Sciences and Natural Resources at Oklahoma State University during the 1999/2000 academic year. One hundred two individuals participated in the study for a return rate of 81.6 percent. The population was selected through the use of a list of international graduate students in agriculture provided by the Office Institutional Research at Oklahoma State University.

Institutional Review Board (IRB)

Both federal and state laws require an application for review and approval by higher educational institutions specialized organs for any research study that uses human as subjects. The research office of Oklahoma State University institutional Review Board (IRB) is in charge of receiving, reviewing, and approving of applications of researchers who use humans as subjects for their research studies. In compliance with this policy, the investigator of this research study obtained permission from IRB office to conduct this

study. The approval number from IRB was AG-00-048. A copy of the IRB approval form is presented in Appendix C.

Design of the Instrument

A 44-item forced response questionnaire was developed to collect data for this study. To collect the data nominal, interval, ordinal, and modified Likert-type scales were utilized.

Part One of the survey instrument consisted of 11 items addressing the respondents' demographic characteristics, which included gender, age, degree program, academic department, national origin, computer literacy, PC ownership, and Internet and e-mail availability. In part one, nominal and interval scales were used to collect data.

Part Two of the survey instrument consisted of the respondents' perceived level and mastery of computer skills. There were 11 items in Part Two of the survey which addressed the respondents' perceived skills level in selected computer programs, use of electronic mail, and selected computer languages. Data were ascertained using nominal scale.

Part Three of the survey instrument included 11 items which addressed the respondents' skill levels in frequently used multimedia applications, navigation and searching of the Internet, use of instructional multimedia equipment such as Elmo and Liquid Crystal Display (LCD) projector, audio visual presentations, use of sound and movies from the Internet, web page creation, and image and text scanning. Data were collected through the use of a nominal scale.

Part four of the instrument addressed two items which included the geographic location(s) where study participants learned their computer skills and method techniques in acquiring computer skills. In Part Four of the survey instrument, a nominal scale was used in collecting the data.

Part Five sought to ascertain the perceived learning effectiveness, usefulness and future importance of computer and multimedia skills to study participants and preferred method(s) of learning both computer and multimedia skills. This part consisted of four items. To collect the data, a modified Likert-type scale was utilized.

Part Six addressed the study respondents' perceived ranks of importance concerning computer and multimedia skills as graduate students at Oklahoma State University and professionals returning to their respective home countries. There were four items in part six. Data collection was conducted through the use of an ordinal scale.

Part Seven of the survey instrument consisted of one open-ended response item to determine the study respondents' comments and opinions.

To insure validity of the instrument, the author…

1. Distributed instruments to his AGED 5980-Research Design classmates during the 1999 fall semester to critique and make suggestions for improvement and/or clarity. Points raised were taken into account and suggestions incorporated in the draft copy of the questionnaire.
2. Questionnaires were also shared with key faculty who possessed computer and multimedia expertise to serve as members of the instrument review team (Appendix D). Review team members were asked to make suggestions for improving the instrument for both content and clarity.

3. The instrument was pilot tested with the cooperation of twenty international students outside the College of Agricultural Sciences and Natural Resources at Oklahoma State University to insure understanding and clarity of survey items.

In further addressing validity, Key (1996) suggested researchers ask themselves...

> How can a researcher be sure that the data gathering instrument being used will measure what it's supposed to measure and do it in a consistent manner? This is a question that can only be answered by examining the definitions for and methods of establishing the validity and reliability of a research instrument (p 113).

Warwick and Lininger (1975) pointed out two basic goals in questionnaire design.

1. To obtain information relevant to the purpose of the study.
2. To collect valid information.

According to Mason and Bramble (1989) validity can be defined as the degree to which a test measures what it is supposed to measure. Three basic approaches to the validity of tests and measures include content validity, construct validity, and criterion-related validity. Key (1996) stated content validity...

> Measures the degree to which the test items represent the domain or universe of the trait or property being measured. In order to establish the content validity of a measuring instrument, the researcher must identify the overall content to b represented. Items must then be randomly chosen from this content that will accurately represent the information in all the areas. By using this method the researcher should obtain a group of items which is representative of the content of the trait or property to be measured. Identifying the universe of content is not an

> easy task. It is, therefore, usually suggested that a panel of experts in the field to be studied be used to identify a content area. For example, in the case of researching the knowledge of teachers about a new curriculum, a group of curriculum and teacher education experts might be asked to identify the content of the test to be developed (p 113).

Collection of the Data

The questionnaires were mailed to the 125 of potential respondents using Dillman's (1979) mail survey method March 30, 2000. A letter explaining the purpose of the survey was mailed along with the 44-item questionnaire. The researcher also made personal contacts with the subjects in an effort to increase the response rate. Potential respondents were visited in their academic departments by the investigator. Envelops to return the questionnaires were provided even though the researcher offered to personally collect the completed questionnaires from the subjects' departments. A follow-up of ten percent of the non-respondents was conducted during the week of May 1 to 5, 2000. Non-respondents participating in the follow-up were not notably different than the study participants.

Analysis of the Data

The data were analyzed using descriptive statistics, which included frequency distributions, percentages, and mean ranks. Chi-Square (X^2) test of independence of categorical variables was used to determine the interrelationship between and among variables. In this particular study, the author is employing categorical variables which

involve certain demographic characteristics of the population and selected computer and multimedia skills, their acquisition etc.

Specifically addressing the use of the Chi-Square statistic Hosmand (1988) stated …

> Chi-square analysis is used to test hypotheses about the significance of the differences that may exist between 3 or more sample percentages. Additionally, chi-square is used to test whether 2 variables are independent of each other. When data are derived from several trials in the same experiment, the chi-square test of homogeneity is used to determine how to pool the sample data from all trials (p.210).

In additional, since this study is not with a situation involving a one variable case, but employing categorical variables, Hoshmand (1988) further stated …

> In this test, our interest is focused on the independence between two qualitative variables or population characteristics. Independence is tested for when one set of observations taken under one particular set of conditions is compared with a similar set of observations under a different set of condition. Under such circumstances there are no definite expected values. Therefore, the question is whether the results of the experiments are dependent (contingent upon) or independent of the conditions under which they were observed. This test is referred to as the test of independence or contingency (p.215).

Key (2000) explaining the appropriateness of Chi-square stated …

"The Chi-square assumption of no more than 20 percent of the expected being less than five was not met therefore, the significance should be considered approximate".

In determining the level of relationship between the demographic characteristics (nominal data) and the perceived user skills involving computer and multimedia equipment a Contingency Coefficient value and the approximate significance was calculated. In explaining the level of relationship between and among the variables important to this study, Siegle (1956) in addressing the relevance of contingency coefficients stated …

> The contingency coefficient C is a measure of the extent of association or relation between two sets of attributes. It is uniquely useful when we have only categorical (nominal scale) information about one or both sets of these attributes. That is, it may be used when the information about the attributes consist of an unordered series of frequencies.
>
> To use the contingency coefficient, it is not necessary that we be able to assume underlying contingency for the various categories used to measure either or both sets of attributes. In fact, we do not even need to be able to order the categories in any particular way. The contingency coefficient, as computed from a contingency table, will have the same value regardless of how the categories are arranged in the rows and columns (p.196).

CHAPTER IV

Presentation and Analysis of Data

Introduction

The purpose of this chapter was to assess the perceptions and attitudes of international graduate students in agriculture regarding their computer and multimedia skills, how they learned computer and multimedia skills and their future importance. Furthermore, this chapter embodies a step by step detail analysis and presentation of data.

Study population

A 125 international graduate students in nine (9) departments in the College of Agricultural Sciences and Natural Resources at Oklahoma State University, were identified through assistance provided by the Office of Institutional Research. One hundred and two (102) students returned completed instruments giving a response rate of 81.6 percent. Among the 23 (18.4%) non-respondents five (4%) responded to a follow-up.

Findings of the Study

Presentation of Demographic Information

Part I of the survey instrument was designed to obtain demographic information regarding the international graduate students agriculture at Oklahoma State University. The data presented in the following 11 tables, were described using the descriptive statistics of frequency distributions and percentages. The questions in Part I of the survey considered and obtained information from which future relationships could be described such as gender, age groups, level of degree program, department in the College of Agricultural Sciences and Natural Resources, nationality, computer literacy, Internet availability, and personal computer (PC) ownership by individual international graduate students.

The data shown in Table 1 indicated the distribution of study respondents by gender. Twenty-five (24.5%) female and 77 (75.5%) male graduate students participated in this study.

Table 1

A Distribution Of Respondents By Gender

Gender	N=102	Percentage (%)
Female	25	24.5
Male	77	75.5
Total	102	100.00

The data in Table 2 revealed the distribution of student respondents by age. The largest group of graduate students participating in the study were 33 (32.4%) students

between 26 to 30 years of age, while the smallest group included nine (8.8%) students who were 21 to 25 years of age. The second largest group of international graduate students participating in this study were 29 (28.4%) who were 31 to 35 years of age followed by two groups of 16 (15.7%) and 15 (14.7%) in the 35 to 40 age sequence and 41 years or greater.

Table 2

A Distribution Of Respondents By Age

Age	N=102	Percentage (%)
21-25	9	8.8
26-30	33	32.4
31-35	29	28.4
35-40	16	15.7
41 years or greater	15	14.7
Total	102	100.00

In Table 3, the data showed the distribution of respondents by degree program. Doctoral programs had the highest number of international graduate students with 77 (75.5%) followed by the Master of Science program which included 25 (24.5%) students. At the time this study was conducted, there were no international graduate students in the Master of Agriculture degree program.

Table 3

A Distribution Of Respondents By Degree Programs

Degree Program	N=102	Percentage (%)
Master of Agriculture	-	-
Master of Science	25	24.5
Doctor of Philosophy	77	75.5
Total	102	100.00

The data in Table 4 depicted the distribution of the study respondents by department. As revealed by the data, the department of Agricultural Economics had the largest number of international graduate students with 31 (30.4%) compared to the department of Agricultural Education with the smallest group, two (1.9%) students. The second largest department was Biochemistry and Molecular Biology which had 22 (21.7%) graduate students followed by the departments of Animal Sciences with 14 (13.7%) and Biosystems and Agricultural Engineering had 13 (12.7%) students. These were closely followed by the departments of Entomology and Plant Pathology with seven (6.9%), Plant and Soil Sciences five (4.9%), Horticulture and Landscape Architecture four (3.9%), and Forestry two (2.0%) graduate students. At the time this study was conducted, there were two (1.9) postdoctoral students working in the departments of Biochemistry and Molecular Biology and Microbiology.

Table 4

A Distribution Of Study Respondents By Department

Department	N=102	Percentage (%)
Agricultural Economics	31	30.4
Agricultural Education	2	1.9
Animal Science	14	13.7
Biosystems & Ag Engineering	13	12.7
Biochem & Molecular Biology	22	21.7
Ento & Plant Pathology	7	6.9
Horticure & Landscape	4	3.9
Forestry	2	2.0
Plant & Soil Science	5	4.9
Other	2	1.9
Total	102	100.00

Table 5 data displayed the distribution of student respondents by national origin.

Of the 41 countries represented by graduate students in the College of Agricultural Sciences and Natural Resources, India ranked first with 15 (15.0%) students, while 24 countries including Argentina, Bangladesh, Britain, Burundi, Cambodia, Caribbean, Congo, Egypt, France, Gabon, Iran, Jordan, Kenya, Lebanon, Mali, Namibia, Peru, Portugal, Russia, Sudan, Taiwan, Vietnam, and Zambia were represented by one (1.0) student per country. China followed India with 12 (12.0%) students. Indonesia and Turkey each had five (5.0%) students. Four (4.0%) students each represented Ethiopia, Korea, Pakistan, and Saudi Arabia respectively. Mozambique and Syria had three (3.0%) students each. Two (2.0%) students each also represented Brazil, Cameroon, Canada, Columbia, Japan, Mexico, the Philippines, and Uzbekistan.

Table 5

A Distribution Of Respondents By National Origin (Continued)

National Origin	N=100	Percentage (%)
Mali	1	1.0
Mexico	2	2.0
Mozambique	3	3.0
Namibia	1	1.0
Pakistan	4	4.0
Peru	1	1.0
Philippines	2	2.0
Portugal	1	1.0
Russia	2	2.0
Saudi Arabia	4	4.0
Sudan	1	1.0
Syria	3	3.0
Taiwan	1	1.0
Turkey	5	5.0
Uzbekistan	2	2.0
Vietnam	1	1.0
Zambia	1	1.0
Total	100	100.00

Table 5

A Distribution Of Respondents By National Origin

National Origin	N=100	Percentage (%)
Argentina	1	1.0
Bangladesh	1	1.0
Brazil	2	2.0
Britain	1	1.0
Burundi	1	1.0
Cambodia	1	1.0
Cameroon	2	2.0
Canada	2	2.0
Caribbean	1	1.0
China	12	12.0
Columbia	2	2.0
Congo	1	1.0
Egypt	1	1.0
Ethiopia	4	4.0
France	1	1.0
Gabon	1	1.0
India	15	15.0
Indonesia	6	6.0
Iran	1	1.0
Japan	2	2.0
Jordan	1	1.0
Kenya	1	1.0
Korea	4	4.0
Lebanon	1	1.0

The data in Table 6 illustrated the distribution of respondents according to selected aspects of personal computer (PC) literacy. Eighty-seven (85.3%) of the graduate students who participated in this study classified themselves as computer users. One (0.9%) student did not identify with any computer literacy category. Ten (9.8%) of the graduate students considered themselves as computer programmers, while two (2.0%) student respondents placed themselves in the expert and novice categories respectively

Table 6

A Distribution Of Respondents By Selected Categories Of Computer Literacy

Selected Categories	N=102	Percentage (%)
Expert	2	2.0
Programmer	10	9.8
User	87	85.3
Novice	2	2.0
Other	1	0.9
Total	102	100.00

Table 7 data presented the distribution of respondents by ownership of personal computers prior to their arrival at Oklahoma State University (OSU) as students. The data revealed that 52 (51.5%) students owned personal computers prior to enrolling at OSU. According to the data in the Table 7, 49 (48.5%) students did not have personal computers before coming to OSU.

Table 7

A Distribution Of Respondents By Whether Or Not They owned A Personal computer (PC) Prior To Arriving At Oklahoma State University

Owned a PC Prior to Enrolling at OSU	N=101	Percentage (%)
Yes	52	51.5
No	49	48.5
Total	101	100

The data in Table 8 revealed that 73 (71.6%) of the graduate students after enrolling at OSU purchased computers. The data also showed that 29 (28.4%) students did not own personal computers.

Table 8

A Distribution Of Respondents By Whether Or Not They Purchased A Personal Computer (PC) After Coming To OSU

Purchased a PC After Coming to OSU	N=102	Percentage (%)
Yes	73	71.6
No	29	28.4
Total	102	100.00

The data in Table 9 illustrated the distribution of student respondents by whether or not they had an Internet connection while they were students at Oklahoma State University (OSU). An overwhelming number, 83 (81.4%) indicated they had an Internet connection at OSU. Nineteen (18.6%) of the graduate students indicated they did not have internet connection.

Table 9

A Distribution Of Respondents By Whether Or Not They Had An Internet Connection At Oklahoma State University

Internet connection	N=102	Percentage (%)
Yes	83	82.2
No	19	17.8
Total	102	100.00

The data in Table 10 depicted the distribution of student respondents by Internet availability in their home country. Ninety-eight (97.1%) indicated they had Internet connection available in their home country, while only three (2.9%) stated that the Internet was not available in their home country.

Table 10

A Distribution Of Respondents By Whether Or They Had Internet Availability In Their Home Country

Internet Availability	N=102	Percentage (%)
Yes	98	97.1
No	3	2.9
Total	102	100.00

In Table 11, the data presented showed the distribution of respondents by the ability and capacity to receive electronic mail (Email) in their home country. An overwhelming number, 100 (98.0%) of the study respondents indicated that they had access to electronic mail in their home country. Two (2.0%) graduate students indicated there was no availability of electronic mail in their home country.

Table 11

A Distribution Of Respondents By Whether Or Not They had Availability and Capacity Of Receiving Electronic Mail In Their Home Country

Email Availability	N=102	Percentage (%)
Yes	100	98.0
No	2	2.0
Total	102	100.00

The data in Table 12 illustrated the distribution of student respondents by perceived computer (PC) skills and their mastery levels. Fifty-three (51.9%) graduate students perceived themselves as being in the "moderate" level with regard to word processing, while one (1.0%) student indicated they were in the "low" level category. However, 48 (47.9%) considered themselves in the "high" level category.

Table 12

A Distribution Of Study Respondents By Perceived Personal Computer Skills In Word Processing

Word Processing	N=102	Percentage (%)
High	48	47.9
Moderate	53	51.9
Low	1	1.0
Non-User	-	-
Total	102	100.00

The data in Table 13 depicted study respondents distributed by perceived personal computer (PC) skills in the mastery of spreadsheet applications and mastery levels. Forty-seven (46.1%) respondents classified themselves in the "moderate" level in spreadsheet use, compared two (2.0%) students who fell in the "no" skill category. Forty-one (40.2%) students perceived themselves in the "high" level of mastery with regard to spreadsheet

program uses. Twelve (11.7%) students perceived themselves at the "low" mastery level in the use of spreadsheet software skills.

Table 13

A Distribution Of Respondents By Perceived Personal Computer Skills In The Use Of Spreadsheet

Spreadsheet	N=102	Percentage (%)
High	41	40.2
Moderate	47	46.1
Low	12	11.7
None	2	2.0
Total	102	100.00

The data in Table 14 showed the distribution of student respondents by perceived personal computer (PC) skills and mastery levels in database application. The largest number, 47 (46.1%) of the students saw themselves at the "moderate" mastery level, as compared to 10 (9.8%) students who fell in the "none user" level. Thirty (29.4%) students considered themselves as being in the "low" level category, while 15 (14.7%) students classified themselves as being in the "high" level mastery category with regard to the use of databases.

Table 14

A Distribution Of Respondents By Perceived Personal Computer Skills And Mastery Level

Database	N=102	Percentage (%)
High	15	14.7
Moderate	47	46.1
Low	30	29.4
Non-User	10	9.8
Total	101	100.00

The data shown in Table 15 data presented a distribution of respondents by perceived and personal computer (PC) skills and mastery levels in the use of computer graphics. The largest group, 52 (50.9%) of the students perceived themselves as being in the "moderate" level mastery with regard to graphic use. Eight (7.8%) respondents did not use computer graphic programs. Those in the "low" level mastery category included 22 (21.7%) respondents followed by 20 (19.6%) respondents who themselves "high" level mastery category with regard to computer graphic applications.

Table 15

A Distribution Of Respondents By Perceived Personal Computer Skills In Application Of Graphics

Graphics	N=102	Percentage (%)
High	20	19.6
Moderate	52	50.9
Low	22	21.7
Non-User	8	7.8
Total	101	100.00

The data in Table 16 showed graduate student respondents by their frequency of use with regard to electronic mail. Seventy-three 73 (72.6%) respondents classified themselves at the "high" level mastery with regard to being electronic mail users. However, no respondents considered themselves in the "non user" category. In the subsequent groups of e-mail users, 27 (26.5%) fell into the moderate level mastery category, followed by two (1.9%) respondents who perceived themselves in the "low" level mastery area.

Table 16

A Distribution Of Respondents By Frequency use Of Electronic Mail (Email)

Frequency Of Use	N=102	Percentage (%)
High	73	71.6
Moderate	26	26.5
Low	2	1.9
Non-User	-	-
Total	101	100.00

In Table 17, the data presented classified respondents by whether or not they had learned basic personal computer (PC) languages. The PC language Visual Basic included the largest group, 31 (30.4%) graduate students who had developed "Visual Basic" skills, as compared to four (4.0%) students who learned the "C++" PC language followed by 20 (19.6%) who indicated learning "C". Nineteen (18.6%) indicated they had learned Fortran, while nine (8.8%) indicated skills in "Java". However, 19 (18.6%) respondents were not involved in learning any computer language.

Table 17

A Distribution Of Respondents By Basic Personal Computer (PC) Languages Learned

PC Language learned	N=102	Percentage (%)
C	20	19.6
C++	4	4.0
Java	9	8.8
Visual Basic	31	30.4
Fortran	19	18.6
Non-User	19	18.6
Total	102	100.00

The data in Table 18 illustrated a distribution of student respondents with regard to their skill levels in using multimedia. The largest group, 46 (46.0%) graduate students,

had used power point presentations in their various departments and perceived their skill levels to be in the "moderate" area, while six (6.0%) students had never used power point presentation. Forty (40.0%) respondents perceived their skill level to be in the "high" category contrasted with eight (8.0%) respondents who indicated their perceived skill level in the use of power point presentations was in the "low" mastery category.

Table 18

A Distribution Of Respondents By Multimedia Skill Levels In The Use Of Power Point

Power Point	N=100	Percentage (%)
High	40	40.0
Moderate	46	46.0
Low	8	8.0
Non-User	6	6.0
Total	100	100.00

The data in Table 19, displayed student respondents by multimedia skill levels in using the worldwide web. The largest number, 59 (58.4%) respondents identified themselves as "high" level web searchers, as contrasted to one (1.0%) graduate student who had "no" experience in conducting web searches. Thirty-five (34.7%) graduate student respondents perceived they were in the moderate mastery level category with regard to their ability to searching web sites on the Internet. However, six (5.9%) respondents perceived they were in the "low" mastery level category.

Table 19

A Distribution Of Respondents By Skill Level In The Use Of The Worldwide Web

Worldwide Web Searches	N=101	Percentage (%)
High	59	58.4
Moderate	35	34.7
Low	6	5.9
Non-User	1	1.0
Total	101	100.00

The data in Table 20, depicted respondents by multimedia skills in the use of Liquid Crystal Display (LCD) projectors and "Elmo" overheads. Thirty-nine (38.6%) respondents indicated they perceived themselves in the "moderate" level category as compared to 20 (19.8%) respondents in the low skill level. In the "high" level skill category, there were 21 (20.8%) respondents who indicated their skills in the use of the LCDs or "Elmos". There was also a similar number, 21 (20.8%), of graduate student respondents were in the "non-use" category who indicated "no" skills.

Table 20

A Distribution Of respondents By Multimedia Skills In The Use Of LCD/Elmo Projectors

Projector Usage	N=101	Percentage (%)
High	21	20.8
Moderate	39	38.6
Low	20	19.8
Non-User	21	20.8
Total	101	100.00

In Table 21, the data illustrated the distribution of respondents by multimedia skills in audio visual presentations. In the "moderate" level skill category, 44 (43.6%) respondents indicated their abilities were primarily of the "moderate" skill level with

regard to audio visual presentations, as contrasted to 17 (16.8%) respondents who classified themselves in the "high" skill level category with regard to audio visual presentations. In the "non-user" skill category, 21 (20.8%) students identified themselves as having "no" skills in the use of multimedia in the development of audio visual presentations, while 19 (18.8%) respondents considered themselves in the low skill level category with regard to audio visual presentations.

Table 21

A Distribution Of Respondents By Multimedia Skills In Audio Visual Presentations

Audio Visual Presentations	N=101	Percentage (%)
High	17	16.8
Moderate	44	43.6
Low	19	18.8
Non-User	21	20.8
Total	101	100.00

The data in Table 22 depicted a distribution of respondents by multimedia skills in the use of Photoshop computer programs. Thirty-seven (36.6%) respondents perceived themselves as being in the "moderate" skill category as contrasted to 11 (10.9%) students in the "high" skill level. In addition, 31 (30.7%) respondents classified themselves as being in the "low" skill level regarding photoshop applications, while 22 (21.8%) respondents indicated they were in the "non-user" category concerning photoshop programs.

Table 22

A Distribution Of Respondents By Multimedia In The Skills Of Photoshop

Photoshop Skills	N=101	Percentage (%)
High	11	10.9
Moderate	37	36.6
Low	31	30.7
Non-User	22	21.
Total	101	100.00

In Table 23, the data presented the distribution of study respondents by multimedia skills in the use of Sound and Movies from the Internet. The largest group 40 (39.6%) graduate student respondents, perceived themselves as being in the "moderate" skill level as contrasted to seven (6.9%) respondents in the "high" skill level of sound and movies. The "low" skill level included 29 (28.7%) respondents who used sound and movie occasionally, while 25 (24.8%) respondents were in the "non-user" category with regard to sound and movie usage via the computer and/or multimedia programs.

Table 23

A Distribution Of Respondents By Multimedia Skills In Sound And Movie Usage

Sound and Movie Skills	N=101	Percentage (%)
High	7	6.9
Moderate	40	39.6
Low	29	28.7
Non-User	25	24.8
Total	101	100.00

The data in Table 24 presented the distribution of student respondents by multimedia skills with regard to web page creation on the Internet. The largest group of respondents included 43 (42.6%) graduate students who they were "non-user" with

respect to the creation of web pages as compared to six (5.9%) students who were in the "high" skill level category in creating web pages. On the other hand, 31 (30.7%) students perceived themselves in the "low" skill level category of web page creation, while 21 (20.8) students indicated they fit in the "moderate" skill level category with regard to web page creation.

Table 24

A Distribution Of Respondents By Multimedia Skills In Web Page Creation

Web Page Creation	N=101	Percentage (%)
High	6	5.9
Moderate	21	20.8
Low	31	30.7
Non-User	43	42.6
Total	101	100.00

In Table 25, the data showed the distribution of respondents by multimedia skills with regard to Internet shopping. The largest number, 40 (39.6%), of respondents perceived themselves as being in the low skill level category concerning Internet shopping as contrasted to eight (7.9%) respondents who saw themselves as being in the high skill level Internet shoppers. Thirty-four (33.7%) respondents indicated they fit the moderate skill level category in navigating the Internet in search of their shopping needs. Nineteen (18.8%) respondents indicated they were "non-users" with regard to using the Internet to shop.

Table 25

A Distribution Of Respondents By Multimedia/Computer Skills In Internet Shopping

Internet Shopping	N=101	Percentage (%)
High	8	7.9
Moderate	34	33.7
Low	40	39.6
Non-User	19	18.8
Total	101	100.00

The data in Table 26 illustrated the distribution of respondents by multimedia skills in Internet news reading. Forty (39.6%) of the study participants were news readers on the Internet, while seven (6.9%) students had never read news on the Internet. Forty (39.6%) respondents indicated they were in the "moderately" skill level in internet news reading, while 14 (13.9%) students revealed they perceived themselves in the "low" skill level category.

Table 26

A Distribution Of Respondents By Multimedia Skills In Internet News Reading

Internet News Reading	N=101	Percentage (%)
High	40	39.6
Moderate	40	39.6
Low	14	13.9
Non-User	7	6.9
Total	101	100.00

The data in Table 27 revealed the distribution of respondents by the use multimedia skills in distance education. An overwhelming number, 78 (77.2%) of graduate student respondents had not developed skills in using multimedia applications for distance education as contrasted to one (1.0%) student who perceived themselves as having "high" level skills in distance education. However, 15 (14.9%) respondents

indicated they were in the "low" skill level category, while seven (6.9%) students in the "moderate" skill level category with regard to using multimedia skills to conduct distance education programming.

Table 27

A Distribution Of Respondents By Multimedia Skills In Distance Education

Distance Education	N=101	Percentage (%)
High	1	1.0
Moderate	7	6.9
Low	15	14.9
Non-User	78	77.2
Total	100	100.00

The data in Table 28 illustrated the distribution of study respondents by multimedia skills in scanning photographic images and text. Forty-one (40.6%) respondents indicated they had "moderate" skills in scanning images and text as contrasted to 11 (10.9%) respondents who indicated "no" skills in scanning. Furthermore, 31 (30.7%) students perceived themselves as being in the "low" skill level category, while18 (17.8%) respondents revealed their skill to fit in the "high" level category.

Table 28

A Distribution Of Respondents By Multimedia Skills In Image And Text Scanning

Image and Text Scanning	N=101	Percentage (%)
High	18	17.8
Moderate	41	40.6
Low	31	30.7
Non-user	11	10.9
Total	101	100.00

Table 29, the data depicted the distribution of respondents by the location where

their personal computer skills were learned. The largest number, 44 (43.1%), of graduate student respondents acquired their computer skills in their home country as contrasted to seven (6.9%) respondents who learned computer skills in locations other than their home country or OSU. Twenty-six (25.5%) respondents learned their computer skills at Oklahoma State University only, while 25 (24.5%) students acquired computer skills in both their home country and Oklahoma State University.

Table 29

A Distribution Of Respondents By Location Of Computer Skills Learned

Location(s)	N=102	Percentage (%)
Home Country Only	44	43.1
Home Country & OSU	25	24.5
OSU Only	26	25.5
Other Than Home Country or OSU	7	6.9
Total	102	100.00

The data in Table 30 depicted the distribution of respondents by method(s) of acquiring personal computer skills. An overwhelming number, 85 (83.3%) of students indicated they acquired computer skills through "personal practice" in contrast to three (2.9%) students who learned computer skills through specialized agencies like Computer USA. "Taking graduate class(es)" and "taught by a friend" were the second most popular methods with 45 (44.1%) respondents respectively. Serving as a "Graduate Research Assistant" (RA) was important for 26 (25.5%) students in learning computer skills,while the "frequent use of Oklahoma State University computer laboratories" was a useful method for 23 (22.5%) students. In addition, the "assistance provided by academic advisers" was a useful approach for 15 (14.7%) students, while

taking "computer class(es)" and "serving as a Teaching Assistant" (TA) were positive experiences for six (5.9%) students respectively.

Table 30

A Distribution Of Study Respondents By Method(s) Of Acquiring Computer Skills

Method(s)	N=102	Percentage (%)
Serving as Teaching Assistant	6	5.9
Graduate Class(es)	45	44.1
Serving as a Research Assistant	26	25.5
Took Computer Class(es)	6	5.9
Personal Practice	85	83.3
Taught by friend	45	44.1
Assistance from Academic Adviser	15	14.7
Frequent Use of Computer Labs	23	22.5
Other (Computer USA)	3	2.9

The data in Table 31, illustrated the distribution of respondents by "how" effective the method9s) were in learning computer skills. Fifty-eight (56.9%) students indicated it was "effective" as compared to 18 (17.6%) students who stated that it was "somewhat effective". However, twenty-six (25.5%) graduate students expressed their learning method(s) was "very effective". There were no student respondents who indicated his or her learning method was "not effective".

Table 31

A Distribution Of Respondents By Effectiveness Of Method(s) Used To learn Computer Skills

How effective	N=102	Percentage (%)
Very effective	26	25.5
Effective	58	56.9
Somehow effective	18	17.6
Not effective	-	-
Total	102	100.00

The data in Table 32 illustrated the distribution of respondents by "how useful" their computer skills were professional. Eighty-one (79.4%) students indicated their computer skills were "very useful" to them, professionally as contrasted to nine (8.8%) students who perceived that their computer skills were "useful". Twelve (11.8%) students rated their computer skills as "somewhat useful". No student indicated that his or her computer skills were "not useful".

Table 32

A Distribution Of Respondents By Usefulness Of Computer Skills

Usefulness	N=102	Percentage (%)
Very useful	81	79.4
Useful	9	8.8
Somehow useful	12	11.8
Not useful	-	-
Total	102	100.00

The data in Table 33 presented the distribution of respondents by their preferred method(s) of learning computer skills. Forty-one (40.2%) student respondents preferred hands-on only learning as contrasted to one (1.0%) student who preferred lecture and problem solving as their learning style. Fifteen (14.7%) respondents indicated they

favored demonstration only learning method, while 12 (11.8%) students preferred problem solving only. Nine (8.8%) students combined lecture, demonstration, problem solving, and hands-on as preferred methods of learning computer skills. Eight (7.8%) respondents preferred both demonstration and hands-on learning methods, while seven (6.9%) students preferred problem solving and hands-on learning. Four (3.9%) students combined both demonstration and problem solving learning preferences. Three (2.9%) students preferred lecture as an approach to of learning computer skills, while two (2.0%) students preferred both lecture and demonstration learning methods.

Table 33

A Distribution Of Respondents By preferred Learning Method(s) Of Computer Skills

Preferred learning method(s)	N=102	Percentage (%)
Lecture only	3	2.9
Demonstration only	15	14.7
Problem solving only	12	11.8
Hands-on only	41	40.2
Lecture & Demonstration	2	2.0
Lecture & problem solving	1	1.0
Demonstration & problem solving	4	3.9
Demonstration & hands-on	8	7.8
Problem solving & hands-on	7	6.9
Lect., demo., preb. Solving & hands-on	9	8.8
Total	102	100.00

The data in Table 34 depicted the distribution of respondents by "future importance of computers and multimedia applications" in their areas of specialty. An overwhelming number, 75 (73.5%) of student respondents revealed that computers and multimedia programs were "very important" in their areas of specialty as compared to 12 (11.8%) students who indicated computers and multimedia applications were important

in their areas of specialty. Fifteen (14.7%) students rated the "future importance of computers and multimedia programs" in their areas of specialty as "somewhat important".

Table 34

A Distribution Of Respondents By The Future Importance Of Computers And Multimedia In Their Areas Of Specialty

Future importance	N=102	Percentage (%)
Very important	75	73.5
Important	12	11.8
Somewhat important	15	14.7
Not important	-	-
Total	102	100.00

The data in Table 35, depicted respondents' ranking of importance of selected computer skills and programs, during both their tenure at Oklahoma state University and their perceived return to their home country. As revealed by the ranking of selected computer applications, the graduate students' respondents ranked word processing number one as important skills for both students and returning professionals. Spreadsheets ranked second followed by databases and graphics which were ranked third and fourth respectively. According to the data, there was no notable difference in the order of importance with regard to PC applications among the international graduate students who participated in this study, during their tenure at Oklahoma State University and as a professional returning home.

TABLE 35

Respondents' Ranking Of Importance Of Selected Computer Skills And Programs During Their Graduate Student Tenure And When They Return Home

	Ranking Of Importance			
	During Graduate Student Tenure		When Return To Home Country	
Computer Skills	Mean Score	Rank	Mean Score	Rank
Word Processing	1.7	1	1.8	1
Spreadsheets	2.3	2	2.4	2
Databases	2.8	3	2.7	3
Graphics	3.1	4	2.9	4

The data in Table 36 illustrated respondents' rankings of importance concerning selected multimedia skills during their graduate student tenure at Oklahoma State University and as a professional returning. As indicated by the data, access and navigation of the Internet were ranked first both during the study respondents' stay a at OSU and their return home as professionals. Web searching and power point presentations were ranked second and third respectively. Sound and movies ranked fourth in important for both graduate students and professionals in their countries. While as graduate students, the study respondents ranked multimedia skill of teaching by distance satellite, fourth but as professionals, it was fifth. Photoshop was ranked sixth by the study respondents as students and when they return home, as well as audio visual presentations which was seventh. Multimedia skills in the use of overhead "Elmo" cameras/projectors was ranked eighth as graduate students but placed fourth when perceived as professionals returning home. News reading from the Internet ranked eighth in a tie, while "Elmo" projectors ranked sixth among graduate students in a tie with photoshop when returning home. Web page creation was ninth in a tie with image and text scanning as graduate students. However, as a professional returning home web page creation and scanning images and sound ranked seventh and eighth respectively. Finally, Internet shopping ranked twelfth among graduate students, but ranked ninth by professionals returning home.

TABLE 36

Respondents' Ranking Of Importance Of Selected Multimedia Skills During Their Graduate Student Tenure And When They Return Home

	Ranking Of Importance			
	During Graduate Student Tenure		When Return to Home Country	
Multimedia Skills	Mean Score	Rank	Mean Score	Rank
Internet Access/Navig.	1.7	1	1.8	1
Web Searching	2.3	2	2.5	2
Power Point	2.5	3	2.6	3
Sound & Movies	3.4	4.5	3.3	4.5
Teaching/Satellite	3.4	4.5	3.5	6
Photoshop	3.5	6	3.6	7.5
Audio Visual	3.6	7	3.7	9.5
"Elmo" Projectors	3.8	8.5	3.3	4.5
News Reading	3.8	8.5	3.6	7.5
Web Page creation	4.1	10.5	3.7	9.5
Scanning	4.1	10.5	4.2	10
Internet shopping	4.6	12	4.4	12

Relationship/Association Among Selected Variables

The dependent variables included: (a) "Age;" (b) "Degree program;" (c) "Computer literacy;" and (d) "Owned a PC before coming to OSU." Each of these dependent variables were compared with the following independent variables to obtain Contingency Coefficient Correlation with: (a) "Learning methods;" (b) "Future importance;" (c) "Acquisition of computer skills;" and (d) "Perceived effectiveness."

Using Chi-Square Contingency Coefficient Correlation analysis, a relationship between age and preferred learning method(s) with the Contingency Coefficient provided a value of .446 and an approximate significance of .013 (Table 37). A Correlation Coefficient value of .446 and an approximate significance level of .013 indicated a strong relationship between the variables "Preferred Learning Methods" and "Age". A significant difference was also observed at P = <.05 level of significance.

Table 37

A Relationship Of Age Categories By Selected Preferred Learning Methods Among International Graduate Students in Agriculture

	Preferred Learning Methods				
Age Categories	Lecture	Demon stration	Problem Solving	Hands-On	Total
21-25	1	6	-	3	10
26-30	5	6	1	21	33
31-35	1	6	8	13	28
36	-	4	3	9	16
41 or more	1	2	6	6	15
Total	8	24	18	52	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .446
c. Approximate significance = .013

The Contingency Coefficient value of .205 and approximate significance level of .812 obtained from the Chi-Square Contingency Coefficient Correlation analysis revealed a weak relationship among the variables "Future Importance of Computer and Multimedia Skills" and "Age" (Table 38) which was not statistically significant.

Table 38

A Relationship Of Age Categories By Selected Future Importance Of Computer And Multimedia Skills Among International Graduate Students in Agriculture

	Future Importance Of Computer And Multimedia Skills			
Age Categories	Somewhat Important	Important	Very Important	Total
21-25	1	2	7	10
26-30	5	6	22	33
31-35	2	4	22	28
36	2	3	11	16
41 or more	2	-	13	15
Total	12	15	75	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .205
c. Approximate significance = .812

The data in Table 39 revealed a moderate relationship between "age" and "the acquisition of computer skills" among the study respondents. The Contingency Coefficient value of .284 and approximate significance of .347 obtained from the Chi-square Contingency Coefficient Correlation analysis revealed a moderate relationship between the variables "Acquisition of Computer Skills" and "Age".

Table 39

A Relationship Of Age Categories By Selected Acquisition Of Computer Skills Among International Graduate Students In Agriculture

	Acquisition Of Computer Skills			
Age Categories	Home Country	OSU	Other	Total
21-25	10	-	-	10
26-30	23	8	2	33
31-35	18	8	2	28
36	12	3	1	16
41 or more	7	7	1	15
Total	70	26	6	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .284
c. Approximate significance = .347

The data in Table 40 showed a weak correlation between "age" and "Effectiveness of the Method(s) of Acquiring Computer Skills". The Chi-Square Contingency Coefficient Correlation analysis revealed a Contingency Coefficient value of .202 and an approximate significance of .827. A weak relationship was determined between "Age" and "Effectiveness of the Methods of Learning Computer Skills" but was not significant at P = < .05.

Table 40

A Relationship Of Age Categories By Selected Effectiveness Of The Method(s) Of Acquiring Computer Skills Among International Graduate Students In Agriculture

	Effectiveness Of The Method(s) Of Acquiring Computer Skills			
Age Categories	Somehow Effective	Effective	Very Effective	Total
21-25	3	5	2	10
26-30	7	21	5	33
31-35	4	17	7	28
36	3	9	4	16
41 or more	1	9	5	15
Total	18	61	23	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .202
c. Approximate significance = .827

The data in Table 41 showed a moderate relationship between the variables "Degree Programs" and "Preferred Learning Methods". The Chi-square Contingency Coefficient of Correlation analysis revealed a value of .200 and an approximate significance of .235.

Table 41

A Relationship Of Degree Programs Categories By Selected Preferred Learning Methods Among International Graduate Students in Agriculture

	Preferred Learning Methods				
Degree Program Categories	Lecture	Demon stration	Problem Solving	Hands-on	Total
MS	3	6	1	13	23
Ph.D.	5	18	17	39	79
Total	8	24	18	52	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .200
c. Approximate significance = .235

The data in Table 42 also revealed a moderate relationship between "Degree Program" and "Future Importance of Computer and Multimedia Skills". The Chi-Square Contingency Coefficient Correlation analysis with a value of .239 and approximate significance of .045, illustrated a moderate relationship between the two variables.

Table 42

A Relationship Of Degree Programs Categories By Selected Future Importance Of Computer And Multimedia Skills Among International Graduate Students in Agriculture

	Future Importance Of Computer and Multimedia Skills			
Degree Program Categories	Somewhat Important	Important	Very Important	Total
MS	3	7	13	23
Ph.D.	9	8	62	79
Total	12	15	75	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .239
c. Approximate significance = .045

The data in Table 43 showed a weak relationship between the variables, "Degree Programs" and "Acquisition of Computer Skills". The Chi-Square Contingency Coefficient Correlation analysis with a value of .063 and approximate significance of .817 revealed that about 81 times out of 100, the value .063 would occur by chance.

Table 43

A Relationship Of Degree Program Categories By Selected Acquisition Of Computer Skills Among International Graduate Students in Agriculture

	Acquisition Of Computer Skills			
Degree Program Categories	Home Country	OSU	Other	Total
MS	17	5	1	23
Ph.D.	53	21	5	79
Total	70	26	6	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .063
c. Approximate significance = .817

The data in Table 44 showed a weak relationship between the variables "Degree Programs and "Effectiveness of the Methods of Acquiring Computer Skills". The low value obtained from the Chi-Square Contingency Coefficient Correlation analysis of .079, and the high approximate significance of .727 revealed a weak relationship between the variables. In other words, about 72 times out of 100, the value.079 would occur by chance.

Table 44

A Relationship Of Degree Program Categories By Selected Effectiveness Of Acquiring Computer Skills Among International Graduate Students in Agriculture

	Effectiveness Of Acquiring Computer Skills			
Degree Program Categories	Somehow Effective	Effective	Very Effective	Total
MS	5	14	4	23
Ph.D.	13	47	19	79
Total	18	61	23	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .079
c. Approximate significance = .727

The data in Table 45 showed a strong relationship between the variables "Computer Literacy" and "Preferred Learning Methods". The obtained values from Chi-Square Contingency Coefficient Correlation analysis with a value of .466 and an approximate significance of .005 revealed a strong correlation among the variables. This indicated a close relationship between "Computer and Literacy" and the way the study respondents perceived their "Preferred Learning Methods of Acquiring Computer and Multimedia skills". Significance was revealed at the P = < .05 level.

Table 45

A Relationship Computer Literacy Categories By Selected Preferred Learning Methods Among International graduate Students In Agriculture

	Preferred Learning Methods				
Computer Literacy Categories	Lecture	Demon stration	Problem Solving	Hands-On	Total
Other	-	-	-	1	1
Novice	-	-	-	2	2
User	6	22	15	44	87
Programmer	-	2	3	5	10
Expert	2	-	-	-	2
Total	8	24	18	52	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .466
c. Approximate significance = .005

The data in Table 46 revealed a moderate relationship between the variables "Computer Literacy" and "Future Importance of Computer and Multimedia Skills". The obtained values from the Chi-Square of Contingency Coefficient Correlation analysis had a table value of .273 and an approximate significance of .416 indicating moderate relationship among the variables.

Table 46

A Relationship Computer Literacy Categories By Selected Future Importance Of Computer And Multimedia Skills Among International graduate Students In Agriculture

	Future Importance Of Computer And Multimedia Skills			
Computer Literacy Categories	Somewhat Important	Important	Very Important	Total
Other	-	-	1	1
Novice	1	-	1	2
User	11	15	61	87
Programmer	-	-	10	10
Expert	-	-	2	2
Total	12	18	75	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .273
c. Approximate significance = .416

The data in Table 47 indicated a moderate relationship between the variables "Computer Literacy" and "Acquisition of Computer Skills". The Chi-Square Contingency Coefficient Correlation analysis revealed table value of .228 and an approximate significance of .694 indicating a moderate relationship among the two variables.

Table 47

A Relationship Computer Literacy Categories By Selected Acquisition Of Computer Skills Among International Graduate Students In Agriculture

	Acquisition Of Computer Skills			
Computer Literacy Categories	Home Country	OSU	Other	Total
Other	-	1	-	1
Novice	1	1	-	2
User	59	22	6	87
Programmer	8	2	-	10
Expert	2	-	-	2
Total	70	26	6	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .228
c. Approximate significance = .694

The data in Table 48 indicated a moderate relationship between the variables "Computer Literacy" and "Effectiveness of the Methods of Acquiring Computer Skills". The Chi-Square Contingency Coefficient Correlation analysis showed a coefficient value of .327 and an approximate significance of .143 revealing a moderate relationship between the variables.

Table 48

A Relationship Computer Literacy Categories By Selected Effectiveness Of The Method(s) Of Acquiring Computer Skills Among International Graduate Students In Agriculture

	Effectiveness Of The Method(s) Of Acquiring Computer Skills			
Computer Literacy Categories	Somehow Effective	Effective	Very Effective	Total
Other	-	-	1	1
Novice	-	2	-	2
User	18	52	17	87
Programmer	-	5	5	10
Expert	-	2	-	2
Total	18	61	23	102

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .327
c. Approximate significance = .143

The data in Table 49 showed a weak relationship between the variables "Computer Ownership Prior Coming to OSU" and "Preferred Learning Methods". The low Contingency Coefficient Correlation value of .068 and high approximate significance of .925 obtained from Chi-Square analysis revealed insignificant statistical

relationship between the two variables.

Table 49

ARrelationship Computer Owned A Computer Prior Coming To OSU Categories By Selected Preferred Learning Methods Among International graduate Students In Agriculture

	Preferred Learning Methods				
Computer Ownership Categories	Lecture	Demon stration	Problem Solving	Hands-On	Total
Yes	5	18	13	37	73
No	3	6	5	14	28
Total	8	24	18	51	101

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .068
c. Approximate significance = .925

The data in Table 50 indicated a weak relationship between the variables "Computer Ownership Prior Coming to OSU" and "Future Importance of Computer and Multimedia Skills". The values obtained from Chi-Square Contingency Coefficient Correlation of .023 and approximate significance of .974 which indicated a weak relationship between the variables.

Table 50
A Relationship Computer Owned A Computer Prior Coming To OSU Categories By Selected Future Importance Of Computer And Multimedia Skills Among International Graduate Students In Agriculture

	Future Importance Of Computer And Multimedia Skills			
Computer Ownership Categories	Somewhat Important	Important	Very Important	Total
Yes	9	10	54	73
No	3	4	21	28
Total	12	14	75	101

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.

b. Contingency Coefficient Value = .023
c. Approximate significance = .974

The data in Table 51 indicated a moderate relationship between the variables "Computer Ownership Prior Coming to OSU" and "Acquisition of Computer Skills". The Chi-Square Contingency Coefficient Correlation analysis showed a table value of .136 and an approximate significance of .387 which was evident of a moderate relationship among the variables.

Table 51

A Relationship Computer Owned A Computer Prior Coming To OSU Categories By Selected Acquisition Of Computer Skills Among International Graduate Students In Agriculture

	Acquisition Of Computer Skills			
Computer Ownership Categories	Home Country	OSU	Other	Total
Yes	47	21	5	73
No	22	5	1	28
Total	69	26	6	101

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .136
c. Approximate significance = .387

The data in Table 52 showed a weak relationship between the variables Computer Ownership Prior Coming to OSU" and "Effectiveness of the Learning Methods". The Chi-Square Contingency Coefficient Correlation analysis revealed an observed table value of .088 and an approximate significance of .672 which indicated a rather weak relationship among the variables.

Table 52

A Relationship Computer Owned A Computer Prior Coming To OSU Categories By Selected Effectiveness Of The Method(s) Of Acquiring Computer Skills Among International Graduate Students In Agriculture

	Effectiveness Of The Method(s) Of Acquiring Of Computer Skills			
Computer Ownership Categories	Somehow Effective	Effective	Very Effective	Total
Yes	13	45	15	73
No	5	15	8	28
Total	18	60	23	101

a. The Chi-Square assumption of no more than 20 percent of the expected frequencies being less than five (5) was not met.
b. Contingency Coefficient Value = .088
c. Approximate significance = .672

CHAPTER V

Summary, Conclusions, and Recommendations

Summary

Introduction

The purpose of this chapter was to present a summary of the purpose and objectives problem statement, design and conduct of the study, and the major findings. Also included in the presentation were the conclusions, recommendations which were based upon the analysis and interpretation of data collected and the observations and impressions resulting from the literature review and design and conduct of this study.

Purpose of the Study

The purpose of this study was to determine the level of computer and multimedia skills as perceived by international students enrolled in agricultural graduate programs at Oklahoma State University.

Objectives

The following objectives were established to achieve the goals of this study.

1. To determine selected demographic characteristics of international graduate students in agriculture at Oklahoma State University.
2. To determine perceived computer skills among international graduate students in agriculture at Oklahoma State University.
3. To determine perceived multimedia skills among international graduate students at Oklahoma State University.
4. To determine the perceived learning effectiveness, usefulness and future importance of computer and multimedia skills to international graduate students in agriculture.
5. To determine relationships between certain demographic characteristics and selected computer and multimedia skills and their acquisition.

Design and Conduct of the Study

The design of this study utilized the paradigm of quantitative research. The data for the study was gathered using a 44 item forced-response mail survey instrument (Appendix A) which included seven parts from which data were ascertained. These areas/parts comprised demographics, computer skill levels, multimedia skill levels, and method(s) of acquiring computer skills, perceived learning effectiveness, perceived rank of importance, and an open-ended item for respondents to comment.

Population of the study consisted of 125 international students enrolled in

graduate programs in nine departments in the College of Agricultural Sciences and Natural Resource during the 1999/2000 academic year. One hundred two international students in agriculture responded to the survey giving a response rate of 81.6 percent.

Descriptive statistics to describe and report the data included frequency distributions, percentages, and mean ranks. Chi-Square Contingency Coefficients were used to determine relationships and levels of association among certain demographic characteristics and selected computer and multimedia skills and their acquisition. SPSS 9.0 was used to analyze the data.

Major Findings of the Study

Objective one - Demographic Characteristics

Gender composition of international graduate students in agriculture involved slightly less than one-fourth of the respondents as female, while more than three-fourths were male.

The distribution of study participants by age indicated over 60 percent of the respondents ranged from 26 to 35 years of age. The largest group, slightly more than 32 percent of respondents, was in the 26 to 30 year age category, while the smallest group included almost nine percent in the 21 to 25 year age group. It was somewhat surprising to find that almost 15 percent of the respondents were 41 years of age or older.

A review of the respondents by the graduate degree(s) which they were pursuing showed that over 75 percent were seeking completion of Ph.D. programs, while more than 24 percent were working toward achieving the Master of Science degree.

The distribution of international students in agriculture involved almost 52 percent of the respondents in two departments. The department of Agricultural Economics included 30 percent while, Biochemistry and Molecular Biology had almost 22 percent of the international graduate students in the College of Agricultural Science and Natural Resources. The Department of Agricultural Education, Communications, and 4-H Youth Development had the smallest international graduate student enrollment with two percent.

Distribution of the study respondents by national origin, showed that 41 countries were represented in the College of Agricultural Sciences and Natural Resources. Twenty- seven percent of the graduate students came from China and India. India had the largest representation with 15 percent as graduate students in agriculture at OSU followed by China with 12 percent.

With regard to computer literacy, 85 percent of the study respondents perceived themselves as computer "users". About 10 percent of the respondents considered themselves "computer programmers", while two percent of respondents respectively identified themselves as computer "experts" and "novices".

The study found over 51 percent of the respondents owned personal computers prior to becoming students at Oklahoma State University, while personal computer (PC) ownership increased to over 71 percent after enrolling in a graduate program.

Further evidence of computer familiarity is borne out with over 82 percent of the respondents having internet connections as students at Oklahoma State University, while more than 97 percent indicated internet availability in their home country. In addition, 98

percent of the respondents revealed they had either the availability or capacity of receiving e-mail in their home country.

Objective Two – Perceived Computer Skills.

In reporting the respondents perceived computer skills, it was observed from the findings that most were in the "moderate" and "high" categories with regard to skill level. Specifically, almost 52 percent rated themselves as "moderate" in word processing, while nearly 48 percent perceived themselves in the "high" category. However, with regard to spreadsheet skills, it was observed that the respondents were not as concentrated in the "moderate" and "high" categories. Slightly over 46 percent perceived themselves in the "moderate" level skill category, while slightly more than 40 percent saw themselves as having a "high" skill level in the use of spreadsheets. However, almost 14 percent indicated their spreadsheet skills were in the "low" or "none" categories. With regard to database skills, slightly over 46 percent indicated their skill levels were in the "moderate" category, while more than 29 percent stated their skill levels were in the "low" category. The exception being, almost 15 percent of the respondents perceived themselves in the "high" skill category in the use of databases. In the application of graphics, slightly over 51 percent of the study respondents stated their skills were in the "moderate" category, while almost 23 percent perceived themselves in the "low" skill category and nearly eight percent were "non-users". The exception again, somewhat less than 20 percent were in the "high" skill category. In observing the frequency of use for electronic mail among international graduate students in agriculture, over 71 percent indicated they were 'high"

level users, while more than 26 percent were in the "moderate" use group. In reporting the respondents perceptions with regard to their skills in various computer languages, it was observed that over 30 percent indicated having skills in the use of "Visual Basic,' while more than 26 percent reported having learned the PC language of "C".

Objective Three - Perceived Multimedia Skills

With regard to the various multimedia skills, most of the respondents saw themselves primarily in the "moderate" skill level category with some exceptions. Specifically, the distribution of respondents in working with power point revealed that 45 percent perceived their skills were in the "moderate" category, while 40 percent believed their skills to be at the "high" level. In the use of the World Wide Web (WWW), over 58 percent perceived their level of expertise to be in the "high" category, while almost 35 percent indicated they fit in the "moderate" skill group. More than 38 percent of the study respondents indicated their perceived skill level in the use of LCD and Elmo projectors was in the "moderate"category, while almost 21 percent perceived themselves in the "high" skill category. However, another 21 percent of the respondents indicated they were "non-users". The respondents' skill levels in the use of audio visual presentations revealed more than 43 percent indicating they best fit the "moderate" skill level category, while almost 21 percent indicated they were in "non-users". Furthermore, nearly 19 percent reported their level of expertise was in the "low" level category. In the use of photoshop, more than 36 percent felt they were in the "moderate" skill category, while over 30 percent perceived themselves in the "low" skill category. More than 39 percent of the respondents reported their level of skill regarding the use of sound and internet

movies fit in the "moderate" category, while more than 28 percent reported having a 'low" level of skill in this area. In regard to web page creation, more than 30 percent of the study respondents indicated their level of skill was best described as being in the "low" category, while over 42 percent expressed they were "non-users". In the use of internet shopping skills, more than 39 percent of the respondents perceived their skills to be in the "low" category, while over 33 percent reported they best fit the "moderate" category.

It was interesting to note in regard to internet news reading, the respondents indicated their particular level of skill best fit the "high" and "moderate" categories with 39 percent each respectively. Over 77 percent of the international graduate student respondents expressed they were a better fit in the "non-user" category regarding their skills in using multimedia for providing distance education programming. Furthermore, it was observed that most of the respondents saw themselves as having "moderate" and "low" skill levels in the use of image and text scanning with over 40 and more than 30 percent respectively.

Objective Four – Perceived Learning Effectiveness, Usefulness, and Future Importance

In acquiring computer skills, slightly over 43 percent of the international graduate student respondents in agriculture indicated they acquired computer expertise in their home country prior coming to OSU. However, more than 25 percent expressed they developed their computer skills as a student at Oklahoma State University, while over 24 percent reported their computer skill development was a combination of efforts in both

their home country and at OSU. After their arrival at OSU, slightly over 44 percent of the respondents related that their computer expertise was developed through efforts of "friends" teaching them how to use various programs and software packages. In addition, more than 83 percent also reported their computer skills were acquired through personal practice, while slightly over 44 percent indicated their computer skill development was refined through the requirements of graduate courses.

Observation of the findings concerning the effectiveness of the teaching/learning methods used in acquiring computer skills revealed that over 82 percent of the respondents indicated the methods ranged from "effective" to "very effective". Furthermore, over 79 percent of the respondents perceived the usefulness of computer skills as "very useful". More than 88 percent of the respondents indicated the computer skills which they had attained ranged from "useful" to "very useful". In regard to the preferred methods of learning computer skills, more than 40 percent of the respondents expressed a preference for "hands-on" learning. Furthermore, almost 67 percent of the respondents included only three learning preferences in attaining computer skills which comprised "hands-on learning", "demonstration", and "problem solving". In addition, more than 73 percent of the respondents believed the future importance of computer and multimedia skills in their personal specialty areas were "very important".

The rankings of computer skills and their importance to the respondents as graduate students at OSU and future importance in the respondents' home countries revealed the same rank order. Word processing, spreadsheets, databases and graphics were ranked first to fourth respectively concerning both current and future importance. In addition, the respondents top three multimedia skills for both current and future

importance with overall ranks of first to third included internet access, web searching and power point presentations.

Objective Five - Relationships Between Certain Demographic Characteristics and Selected Computer and Multimedia Skills

The Chi-Square Contingency Coefficient Correlation analysis revealed a weak relationship among most of the variables analyzed. However, strong relationships were observed among "Preferred Learning Methods" and "Computer Literacy" categories and also "Age" and "Preferred Learning Methods". In addition, these two relationships among certain demographic characteristics and selected computer and multimedia skills were the only comparisons to reveal a significant relationship.

Conclusions

Examination, analysis and interpretation of the data and major findings provided the author the opportunity to draw the following conclusions:.

1. International graduate students in agricultural programs at Oklahoma State University were primarily involved in Ph.D. programs. Agricultural Economics and Biochemistry and Molecular Biology seem to attract a rather large proportion of the international graduate students in agriculture. Furthermore, Asia by far was home to the largest contingent of international graduate students in agriculture at Oklahoma State University.

2. It was apparent most international graduate students in agriculture owned their own computers and considered themselves as computer users. Further evidence of computer familiarity involved internet availability and capability of the respondents as well as availability and capacity to use e-mail in communicating locally and with others in their home country.
3. Overall, it was fairly evident most international graduate students in agriculture described their skill levels with basic computer programs/applications as "moderate" to "high". Also, it was rather obvious there was "high" level of use among international graduate students in agriculture with regard to electronic mail.
4. It was apparent from the study findings there were corresponding associations with regard to age and the acquisition of computer skills as well as substantial utility among respondents concerning the degree programs and future importance of computer and multimedia skills they attained. Therefore, it can be further concluded that a student maturity, previous experience with computers prior to graduate school and the mentoring process are important factors in the student's professional growth, the contribution he/she is able to make in returning to their home country, and the opportunity to develop an understanding and cognizance of one's learning style preference(s).
5. It seems to be fairly well documented throughout this study that international graduate students in agriculture at Oklahoma State University seem to be rather competent in the basics with regard to computer

programs, while having somewhat limited expertise in the areas of web page creation and providing distance education programming.

6. Furthermore, it was rather obvious many international students in agriculture see themselves as having primarily "moderate" skill levels with regard to the use of multimedia equipment. Therefore, as a whole it can be concluded, international graduate students in agriculture at Oklahoma State University have not had the opportunity to gain adequate experience in the use of multimedia equipment and develop the self-confidence they need in using it.

Recommendations

The subsequent recommendations were based on the results, inferences, and insight of conducting this study.

1. The contributions international students make to the College of Agricultural Sciences and Natural Resources are enormous. Therefore, it is in the best interest of the departments in the College of Agricultural Sciences and Natural Resources to address the needs of international graduate students regarding their aspirations to learn and acquire computer and multimedia skills in order to be competitive in a world of rapid technological change.

2. There should be an interdepartmental computer course(s) specifically designed to teach required computer and multimedia skills at the

graduate level. A collaborative effort in designing and teaching the course should be developed.

3. International graduate students in agriculture should form/develop and organization oriented toward the mastery of computer and multimedia technology. This organization should seek membership among both international and domestic students who have an interest in sharing technical expertise with each other. Through this forum, novices in computer and multimedia literacy would have the opportunity to benefit from those who have acquired skills in this area. One on one teaching and mentoring would take place without embarrassment for beginners who are many times too shy to ask.

4. Based on the study findings, it was rather evident that "practice", "graduate class(es)" and "friends" are important considerations in developing practical skills in the use of personal computers and multimedia equipment. Therefore, it can be shown graduate students advisement and mentoring are important components in an international student development and professional growth. Since the perceived usefulness and future importance of computer and multimedia skills are such a vital part of a student's success, it further confirms the role of the academic adviser or major professor in providing practical and quality experiences.

Recommendation for Further Research

The author would like to recommend further study addressing international graduate students' satisfaction with computer and multimedia learning environments and

opportunities provided by their academic departments. Since this is a constantly changing area and very important for academic and professional development of graduate students, a study in this area would provide insight as to how each department is progressing and create an opportunity for improvements.

Implications

Since most international students go back to their home countries, it is in the best interest of the College and faculty as "American Academic Ambassadors" to work collaboratively in preparing international graduate students to provide leadership and technical expertise needed to make positive contributions in their home countries. This becomes especially important in the recruitment and training of future international graduate students. Providing need oriented quality technical and leadership skills would make a positive and long lasting impact on the returning young professional and benefit their countries. This would build and foster mutual relationships between the U.S. and the students' home countries. This type of relationship would provide trade opportunities between the countries and increase economic growth and development as well as improving the standard of living among the people of those countries.

The findings do not reveal whether or not the nine departments within the College of Agricultural Sciences and Natural Resources provide adequate computer and multimedia training to international graduate students to become computer literate and efficient to match the expectations placed on them by faculty who require computer and multimedia expertise while assisting with teaching and research activities. However, the quality of training in computer and multimedia areas provide international graduate

students an opportunity to have a positive impact in their respective home countries to provide leadership in the development of institutional training for undergraduate students, improve rural and economic development strategies for the benefit of disadvantaged communities, and their personal professional advancements.

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APPENDICES

APPENDIX A

COVER LETTER

Date: April 17, 2000

From: Umaru Sule
To: Graduate Students in the College of Agricultural Sciences and Natural Resources.
Subj: My thesis survey questionnaire.

Dear Fellow Graduate Students,
Recently I sent my thesis research questionnaire through your department's secretary by putting a copy each in your departmental mailbox. I counted on your understanding and cooperation as a graduate student who is either working on his/her thesis or dissertation that you know the importance of research for a graduate student. I fully understand that you are extremely busy with your research, classes, work, and/or family matters.

My research questionnaire takes just ten minutes to fill. I was very conscious of the above factors when I developed my survey instruments. I would plead with you once more to take ten minutes out of your precious time to fill my research questionnaire lying on your table. If in case you have lost the copy, please let me know as soon as possible so that I can rush a copy to you. My office telephone number is 744-7651 Agricultural Hall room 545C. Dear colleague I have time limit for data collection and analysis as you know. I have to have all data collected by Monday April 24, 2000. I would greatly appreciate it if you could fill and return my questionnaire by Friday or latest Monday April 24, 2000. You can either call me at the above phone number to come pick it up, or you can leave the questionnaire with your department's secretary. I will keep checking with the secretaries. If in case you call while I am not here, please leave a message I will get back to you as soon as I get the message.

All data collected are confidential. Questionnaires will be shredded after analyses are completed. Your cooperation and participation are very important to the completion of my research.

Please if you have filled and returned my survey, ignore this letter.

I greatly appreciate you cooperation and timely response

APPENDIX B

QUESTIONNAIRE

3. **Please rank only the top five multimedia skills from one to five (1st, 2nd, 3rd, 4th, and fifth) in their order of importance to you as a graduate student.**

Internet Access:_____
Power Point Presentations:_____
Searching the Worldwide Web:_____
Use of overhead camera projectors:_____
Audio Visual Presentations:_____
Photobshop (Adobe):_____
Sound and Movies usage:_____
Web page Creation:_____
Internet Shopping:_____
News Reading (Acrobat):_____
Teaching Via Satellite/TV:_____
Scanning:_____

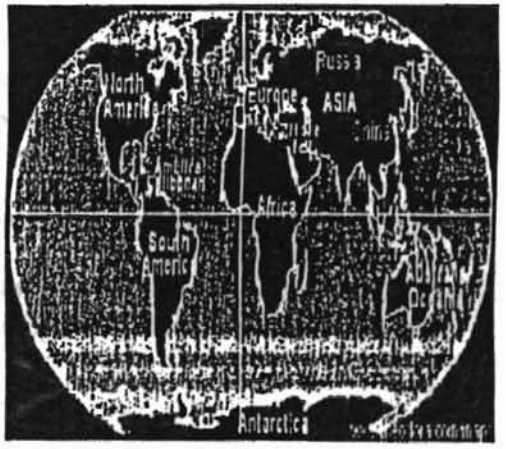
4. **Please rank only the top five multimedia skills from one to five (1st, 2nd, 3rd, 4th, and fifth) by their order of future importance to you when you return to your home country.**

Internet Access:_____
Power Point Presentations:_____
Searching the Worldwide Web:_____
Use of overhead camera projectors:_____
Audio Visual Presentations:_____
Photobshop (Adobe):_____
Sound and Movies usage:_____
Web page Creation:_____
Internet Shopping:_____
News Reading (Acrobat):_____
Teaching Via Satellite/TV:_____
Scanning:_____

PART VII. Comments: Please feel free to add anything you consider important that I have not included.

_____
_____
_____
_____
_____

Oklahoma State University



Department of Agricultural Education, Communications and 4-H Youth Development

"An Assessment of Computer and Multimedia Skills among International Graduate Students at Oklahoma State University"

Umaru Sule
545C Ag Hall
744-7651
Please feel free to contact me if you have questions

Survey for International Graduate Students in Agriculture at Oklahoma State University, for the academic year 1999/2000.

PART I. Demographics: Mark (X) the response below which best describes you. Thank you for your cooperation.

1. **Gender:**
   - ☐ Female
   - ☐ Male

2. **Age:**
   - ☐ 21-25
   - ☐ 26-30
   - ☐ 31-35
   - ☐ 36-40
   - ☐ 41 years of age or greater

3. **Degree Program:**
   - ☐ MAG
   - ☐ MS
   - ☐ PhD
   - ☐ Other (specify)_____

4. **Department:**
   - ☐ AGEC
   - ☐ AGED
   - ☐ ANSI
   - ☐ BAE
   - ☐ BIOC
   - ☐ ENTO & PLP
   - ☐ HORT
   - ☐ FOR
   - ☐ PLNT & SOIL
   - ☐ Other (specify)_____

3. **What was your preferred method(s) of learning/acquiring computer skills?**
   - ☐ Lecture
   - ☐ Demonstration
   - ☐ Problem-solving
   - ☐ Hands-on or experiential learning

4. **Future importance of computers and Multimedia in your specialty area?**
   - ☐ Very important
   - ☐ Somewhat important
   - ☐ Important
   - ☐ Not important

PART VI. Perceived Rank of Importance:

1. **Please rank the following computers skills from one to four (1st, 2nd, 3rd and 4th) in their importance to you as a graduate student.**
   Word Processing:_____
   Spreadsheet:_____
   Database:_____
   Graphics:_____

2. **Please rank the following computer skills from one to four (1st, 2nd, 3rd, and 4th) by their order of importance to you when you return to your home country.**
   Word Processing:_____
   Spreadsheet:_____
   Database:_____
   Graphics:_____

4. **Graphics:**
   ☐ High ☐ Moderate
   ☐ Low ☐ None

5. **E-mail: Frequency of usage.**
   ☐ High ☐ Moderate
   ☐ Low ☐ None

Computer Languages: Please indicate (X) whether or not you have learned a specific computer language or languages.

1. **C:**
   ☐ Yes ☐ No

2. **C+:**
   ☐ Yes ☐ No

3. **C++:**
   ☐ Yes ☐ No

4. **Java:**
   ☐ Yes ☐ No

5. **Visual basic:**
   ☐ Yes ☐ No

6. ☐ Other (specify)_____

PART III. Multimedia Skills: Please Mark (X) the response, which best describes your skill level.

1. **Power Point Presentations:**
   ☐ High ☐ Moderate
   ☐ Low ☐ None

2. **Searching of the Worldwide Web:**
   ☐ High ☐ Moderate
   ☐ Low ☐ None

3. **Use of overhead camera projectors ("Elmo & LCD"):**
   ☐ High ☐ Moderate
   ☐ Low ☐ None

4. **Audio Visual Presentations:**
   ☐ High ☐ Moderate
   ☐ Low ☐ None

5. **Photoshop (Adobe):**
   ☐ High ☐ Moderate
   ☐ Low ☐ None

6. **Sound and Movie Usage from the Internet:**
   ☐ High ☐ Moderate
   ☐ Low ☐ None

7. **Web Page Creation:**
   ☐ High ☐ Moderate
   ☐ Low ☐ None

8. **Internet Shopping:**
   ☐ High ☐ Moderate
   ☐ Low ☐ None

9. **News Reading (Acrobat) from the Internet:**
   ☐ High ☐ Moderate
   ☐ Low ☐ None

10. **Teaching Via Satellite/TV long distance:**
    ☐ High ☐ Moderate
    ☐ Low ☐ None

11. **Image and Text Scanning:**
    ☐ High ☐ Moderate
    ☐ Low ☐ None

PART IV. Acquisition of Computer Skills:

1. **I learned my Computer Skills:**
   - ☐ Home Country ☐ OSU
   - ☐ Other (specify)_____

2. **How did you acquire multimedia skills? (Check all that apply)**
   - ☐ Serving as TA for undergraduate class(es)
   - ☐ Graduate class(es)
   - ☐ Serving as Research Assistant (RA)
   - ☐ Took computer class(es) from my department
   - ☐ Personal practice
   - ☐ Was taught by friend(s)
   - ☐ Assistance provided by academic advisor
   - ☐ Frequent visits to OSU computer labs
   - ☐ Other (specify)_____

PART V. Perceived Learning Effectiveness, Usefulness, and Future Importance of Computer Skills:

1. **How effective was the method(s) you used in acquiring computer skills?**
   - ☐ Very effective
   - ☐ Effective
   - ☐ Somehow effective
   - ☐ Not effective

2. **Usefulness of computer and multimedia skills to you professionally?**
   - ☐ Very useful
   - ☐ Somehow useful
   - ☐ Useful
   - ☐ Not useful

5. **Nationality: Please print your home country.**
   Home country

6. **Computer Literacy:**
   - ☐ Expert ☐ Programmer
   - ☐ User ☐ Novice
   - ☐ Other (specify)

7. **Owned a PC prior to coming to OSU.**
   ☐ Yes ☐ No

8. **Currently own PC at OSU as a student.**
   ☐ Yes ☐ No

9. **Connected to the Internet at OSU.**
   ☐ Yes ☐ No

10. **Internet availability in your home country?**
    ☐ Yes ☐ No

11. **Capacity/availability to receive e-mail in your home country?**
    ☐ Yes ☐ No

PART II. Perceived Computer Skill Levels:
Please indicate your perceived level of mastery.

1. **Word Processing:**
   - ☐ High ☐ Moderate
   - ☐ Low ☐ None

2. **Spreadsheet:**
   - ☐ High ☐ Moderate
   - ☐ Low ☐ None

3. **Database:**
   - ☐ High ☐ Moderate
   - ☐ Low ☐ None

APPENDIX C

PANEL OF EXPERTS

Dr. Charles B. Cox – state 4-H Program Specialist

Dr. Renee A. Daugherty – Extension Specialist, FRCD

Dr. James P. Key – Professor Emeritus, AGED, COM, & 4-H

Dr. Rob Terry, Jr – Associate Professor, AGED, COM & 4-H

Dr. William G. Weeks – Associate Professor, AGED, COM & 4-H

APPENDIX D

IRB APPROVAL

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD

Date: November 15, 1999 IRB #: AG-00-048

Proposal Title: "AN ASSESSMENT OF COMPUTER AND MULTIMEDIA SKILLS AMONG INTERNATIONAL GRADUATE STUDENTS AT OKLAHOMA STATE"

Principal Investigator(s): James White
Umaru Sule

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

Signature:

Carol Olson

Carol Olson, Director of University Research Compliance

November 15, 1999
Date

Approvals are valid for one calendar year, after which time a request for continuation must be submitted. Any modification to the research project approved by the IRB must be submitted for approval with the advisor's signature. The IRB office MUST be notified in writing when a project is complete. Approved projects are subject to monitoring by the IRB. Expedited and exempt projects may be reviewed by the full Institutional Review Board.

VITA

UMARU JIMBERILA SULE

Candidate for the degree of

Master of Science

Thesis: AN ASSESSMENT OF COMPUTER AND MULTIMEDIA SKILLS AMONG INTERNATIONAL GRADUATE STUDENTS IN AGRICULTURE AT OKLAHOMA STATE UNIVERSITY

Major Field: Agricultural Education

Biographical: Personal Date: Born in Wum Menchum Division North West Province of Cameroon July 12, 1962. Son of Sule Sambo and Hawa Abdulahi. My parents lived in a rural area and were ranchers. Married to Aissatou Madina in Didango Cameroon and have one son Mohaamadu Abdul Samad Sule. We lived in Wum North West Province.

Education: Received General Certificate of Education Ordinary Level (GCE) from the Government Bilingual High School Bamenda in 1987 and attended Bamenda School for the General Certificate of Education Advanced Level in 1989. Attended Stockbridge College of Agriculture in Amherst, Massachusetts 1990 to 1992. Obtained an Associate's degree in Animal Agriculture in May 1992. Completed the Bachelor of Science (BS) degree in Animal Science at the University of Massachusetts, May 1994. Completed the requirements for the Master of Science degree program in Agricultural Education at Oklahoma State University, Stillwater, Oklahoma July 2000.

Professional Experience: Served as a Teaching Assistant for the Department Agricultural Education, communications, and 4-H Youth Development in International Agriculture from August1998 to May 2000. Worked as an agricultural extension agent for Heifer Project International (HPI) from November 1994 to April 1998. Served as an Cooperative Extension Agricultural Intern at Kansas State University, Manhattan, Kansas April 1991 to July 1991.