FACULTY PERCEPTIONS ABOUT ATTRIBUTES AND BARRIERS IMPACTING DIFFUSION OF WEB-BASED DISTANCE EDUCATION (WBDE) AT THE CHINA AGRICULTURAL UNIVERSITY

A Dissertation

by

YAN LI

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2004

Major Subject: Agricultural Education

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Approved as to style and content by:

James R. Lindner (Chair of Committee)	Kim E. Dooley (Member)
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August 2004

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ABSTRACT

Faculty Perceptions about Attributes and Barriers

Impacting Diffusion of Web-based Distance Education (WBDE)

at the China Agricultural University. (August 2004)

Yan Li, B.S., Nankai University;

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The purpose of this study was to examine faculty perceptions about attributes and barriers impacting diffusion of Web-based distance education (WBDE) at the China Agricultural University (CAU). Random and stratified sampling was used and 273 faculty participated in the study. About 70% of participants stayed in early stages in the innovation-decision process related to WBDE (no knowledge, knowledge, or persuasion) and about 30% were in later stages (decision or implementation). Faculty members' stage differed significantly by professional area, level of education, teaching experience, and distance education experience. Gender, age, and academic rank had no significant influence on faculty members' stage.

CAU faculty tended to agree with the existence of the five attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability). Professional area, gender, age, level of education, and academic rank had no significant influence on the five perceived attributes. Teaching experience had no significant influence on the five perceived attributes, except compatibility. Distance education experience had no significant influence on the five perceived attributes, except compatibility and observability.

CAU faculty perceived ten factors (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure) as moderate barriers to diffusion of WBDE. Age, level of education, academic rank, and teaching experience had no significant influence on faculty perception about the ten barriers. Professional area and gender had no significant influence on faculty perception about the ten barriers, except concerns about time. Distance education experience had no significant influence on faculty perception about the ten barriers, except conflict with traditional education.

Faculty members' stage in the innovation-decision process had no significant influence on faculty perceptions about relative advantage of WBDE and nine of the ten barriers. Faculty members' stage in the innovation-decision process, however, did have a significant impact on faculty perception about compatibility, complexity, trialability, observability of WBDE, and WBDE program credibility as a perceived barrier. Relative advantage, compatibility, complexity, and trialability were correlated with at least one of the ten barriers. Observability was not related with any of the barriers.

DEDICATION

To my dear Mom and Dad

Thank you so much for giving me life, for bringing me up during hardship, for guiding me into the world of knowledge, for teaching me to be a kind and righteous person before being any one else. No words could express exactly my appreciation for your love for me. I will use my lifetime to tell you: thank you so much and I love you forever!

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CHAPTER I

INTRODUCTION

As the world's most populous country, the People's Republic of China (population≈1.30 billion people) accounts for 20% of the world's population (Central Intelligence Agency, 2004a). As the largest developing country in the world, the Chinese economy relies heavily on agriculture. During 2001, 50% of the Chinese population were employed within the production agriculture section; compared with 2% in the United States. In the same year, agriculture accounted for 14.5% in GDP in China, as compared with 2% in the United States (Central Intelligence Agency, 2004a; 2004b).

During the last two decades, a series of revolutionary reforms in China's political, economic, and social systems have occurred. China has been experiencing a rapid development period since the early 1980s. According to the 1997 World Development Report issued by the World Bank, the GNP per capita for China in 1995 was \$620 and the average growth rate in the period 1985-95 reached 8.3 percent (World Bank, 1997).

Development of Chinese modern education systems, especially the higher education system, has been an important part of this progress. The report of the Party's Fifteenth National Conference pointed out: "The progress of Chinese modernization mainly depends on the advance of personnel quality and the development of human resources across the nation" (Jiang, 1997, p.4).

This dissertation follows the style and format of the *Journal of Agricultural Education*.

In Chinese higher education system, distance education plays an irreplaceable role in letting more people access higher education at low cost (Daniel, 1996). Research has shown that distance learning, due to its features of openness, economic efficiency, flexibility, has made specific and significant contributions not only to Chinese higher education, but also to socio-economic development (Ding, 1998). Distance education has made it possible in China for more people, especially people who are employed adults, school leavers, disadvantaged groups, or people in remote, mountainous, rural, and minority nationality areas where economy, science and technology, education, and culture are underdeveloped, have a chance to access higher education. Distance higher education in China has achieved high economic efficiency that has been recognized by governments and by the general public (Ding, 1998).

In China, there are three generations of distance education programs: (1) correspondence education, (2) radio and TV education and state examinations for self-study, and (3) two-way interactive tele-education (Ding, 1994; 1996; 2000). Correspondence education began in the 1950s. At present, there are 635 conventional universities and four independent correspondent colleges that are using correspondence education programs.

Radio and TV education began in 1960 and were rebuilt in 1979. China owns the largest mega-university system in the world----Chinese Radio and TV Universities (RTVUs) system, which includes China Central Radio and TV University (CCRTVU), 44 RTVUs at the provincial level, 496 branch schools at the prefecture and city level, 1,742 study centers at the county level, and 17,076 teaching classes (Daniel, 1996).

Additional Radio and TV schools were established at the national level during the 1980s. These additional schools include TV secondary specialized schools, Satellite TV Education (STVE), National Agricultural Radio and TV Schools Systems (NARTVS), Chinese TV Teacher Training Institute (CTVTTI), and China Education TV (CETV). In 1990, Liaoyuan Radio and TV School began offering distance education programs that focused on agricultural education and diffusion of agricultural innovative technology in rural China.

Started in 1981, the State Examination for Self-Study System is another important form characterizing the second generation of Chinese distance education. It has been classified as a "quasi-mode" provider because it is a state examination system that is not institutionalized with full teaching, learning support, and student management functions (Ding, 1995; 1996).

From the mid-1990s, the Internet has been diffusing rapidly in China (Table 1). Although the first electronic mail link with China Satellite Network (CSNET) protocols was established between Germany and China in 1987 (Goldstein, 2000), Internet connectivity in China started only in 1993 (Burkhart, Goodman, Mehta, & Press, 1998). After that, the number of Internet users has grown rapidly, from 2,000 users in 1993 to 59.10 million users at the end of 2002. Nua Internet Surveys (1999) showed that China was predicted to have more Internet users than in the United States by 2010. China has set up an explicit national initiative to develop high-speed data networks. At the same time, China launched its version of national information infrastructure (NII), known as the "Golden Projects" in response to similar initiatives in the developed countries (Tan, Meuller, & Foster, 1997).

Table 1
Internet Growth in China

	Computer Hosts	Internet Users	Domain Names (.cn)	Web Sites	International Bandwidth
Nov 97	299,000	620,000	4,066	1,500	18.64Mbps
July 98	542,000	11,750,000	9,415	3,700	84.64Mbps
Jan 99	747,000	2,100,000	18,396	5,300	143Mbps
July 99	1,460,000	4,000,000	29,045	9,906	241Mbps
Jan 2000	3,500,000	8,900,000	48,695	15,153	351Mbps
July 2000	6,500,000	16,900,000	99,734	27,289	1234Mbps
Jan 2001	8,920,000	22,500,000	189,617	265,405	2799Mbps
Dec 2001	12,540,000	33,700,000	127,319	277,100	7597.5Mbps

Source: China Internet Network Information Center

The development of computer and Internet-related information technology made it possible for the new generation of distance education. In 1997, four leading universities were designated by the Minister of Education for a pilot project in the area of two-way interactive tele-education. Since then, many other universities and schools have been using or plan to use Internet as a distance education tool.

As a leading university in Chinese agricultural higher education, China Agricultural University (CAU) put forward its WBDE program in 2001. The WBDE program was carried out by CAU Net Development Corporations (CAUNDC) under the supervision of both China Agricultural University and SVA JYMEC Network Corporation. The program developed rapidly since it was established. During 2003, about 70 faculty members at CAU were involved in the WBDE programs. Nine majors have been put online and more than 50 local distance education stations have been set up. Currently the number of students involved in WBDE program exceeds 13,000. During the last decade, numerous studies have been conducted on WBDE development. Many researchers suggested applying diffusion of innovations theory in the study of distance education programs (Born & Miller, 1999; Hopey & Ginsburg, 1996; Kilian, 1997; Murphrey & Dooley, 2000; Owston, 1997; Schifter, 2000). "The view of distance education as an innovation provides an important means for understanding the phenomena of distance education, particularly from the perspective of those upon whom its acceptance depends: the faculty" (Dillon & Walsh, 1992, p. 6).

Murphrey and Dooley (2000) summarized faculty perceptions about strengths and opportunities impacting the diffusion of distance education technologies in an American College of Agriculture and Life Science. The strengths included: (1) continuous improvement of DE technologies; (2) ability to reach new audiences and existing demand; (3) presence of early adopters and proximity to technology; (4) reputation for quality content; (5) extensive infrastructure and network; (6) use of technology to enhance teaching and learning; and (7) administrative encouragement and support. The opportunities included: (1) expansion of an audience base to reach nontraditional students; (2) expansion of collaboration with private and public institutions; (3) creation of an individualized and enhanced interactive learning experience; (4) providing unique and specialized courses/programs; and (5) advancement of technology.

Studies in Colleges of Agriculture found that faculty had positive attitudes toward Internet-related information technology and WBDE program (Born & Miller, 1999; Dooley & Murphy, 2001). Research, however, also indicated that many faculty members were not enthusiastic about participating in distance education (Olcott & Wright, 1995). As Newcomb (1992) stated, technology for distance education is ready; however, distance programs in agriculture will not succeed until educators are as ready as the technology. Many studies cite faculty resistance to instructional technology as a primary barrier to the continued growth of distance education programs (Moore, 1994; Moore & Kearsley, 1996; Olcott & Wright, 1995).

Reported inhibitors to faculty members' adoption of Web-based courses included: (1) lack of time; (2) concern about the absence of student-faculty interaction found in the traditional classroom; (3) lack of skills needed to become involved in distance education; (4) lack of recognition for the amount of work and time involved; and (5) lack of technical, administrative, and/or financial support (Wolcott, 1997; Rockwell, Schauer, Fritz, & Marx, 1999). Other concerns about WBDE include: (1) quality about distance education programs; (2) change in institutional methodology; (3) current technological limitations and quality of infrastructure; (4) time commitment; (5) lack of institutional support; and (6) lack of necessary incentives on the part of current and potential adopters.

Murphrey and Dooley (2000) summarized perceived weakness and threats influencing diffusion of distance education technologies. The weaknesses included: (1) limited incentives, development support, and funding; (2) limited knowledge regarding copyright and intellectual property; (3) weak communication channels; (4) slow action on critical issues; (5) lack of skill, expertise, and desire to develop interactive distance education courses; and (6) loss of interaction. The threats included: (1) career and job security; (2) competition from private and public institutions; (3) dependency on outside developers/programmers and security concerns; (4) quality measurement issues; (5) using old models to develop new policies; (6) misinformation on the Internet.

Statement of the Problem

Roger's (2003) diffusion theory shows a general model of the innovation-diffusion process. According to the theory, people's differences in innovativeness and innovation differences explain different adoption rate of innovation. People's differences are differences in characteristics of different adopter categories in innovativeness, while innovation differences are differences in the attributes of innovations (relative advantage, compatibility, complexity, trialability, and observability).

Although a lot of research was done in the United States and some other countries about diffusion of distance education programs, literature shows that, up to now, there is still no systematic study about factors influencing faculty members' adoption of WBDE in China. To apply diffusion theory in Chinese agricultural higher education and to determine faculty perceptions about attributes and barriers impacting diffusion of WBDE in Chinese agricultural higher education, this research project was conducted. The China Agricultural University was selected because it was the leader among Chinese agricultural universities and it was representative of Chinese agricultural higher education.

Research Questions

Specifically, the study sought to answer these research questions:

1. What were faculty perceptions about attributes and barriers influencing diffusion of WBDE at the China Agricultural University?
2. Did different personal characteristics impact faculty perceptions about attributes and barriers impacting diffusion of WBDE?
3. Were China Agricultural University faculty perceptions about WBDE similar with those of their counterparts in the United States?

Purpose of the Study

The purpose of this study was to describe faculty perceptions about attributes and barriers impacting diffusion of WBDE at the China Agricultural University, Beijing, P. R. China, during the 2003-2004 academic year.

Objectives of the Study

1. Describe faculty by selected personal characteristics.
2. Describe faculty by their current stage in the innovation-decision process related to WBDE (no knowledge, knowledge, persuasion, decision, implementation, and confirmation).

3. Describe faculty according to their perceptions about attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability).
4. Describe faculty according to their perceptions about barriers to diffusion of WBDE (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure).
5. Examine the relationship between faculty members' selected personal characteristics and their stage in the innovation-decision process.
6. Examine the relationship between faculty members' selected personal characteristics and their perceptions about attributes of WBDE.
7. Examine the relationship between faculty members' selected personal characteristics and their perceptions about barriers to diffusion of WBDE.
8. Examine the relationship between faculty members' stage in the innovation-decision process and their perceptions about attributes of WBDE.
9. Examine the relationship between faculty members' stage in the innovation-decision process and their perceptions about barriers to diffusion of WBDE.
10. Examine the relationship between faculty perceptions about attributes of WBDE and their perceptions about barriers to diffusion of WBDE.

Theoretical Base

The theoretical base of this study is grounded on Rogers' (2003) diffusion of innovation theory. Specifically, the innovation-decision process model, attributes of innovation, and characteristics of adopter categories were utilized. According to Rogers' (2003) model of the innovation-decision process, an individual's innovation adoption behavior has five stages: knowledge, persuasion, decision, implementation, and confirmation. Individual's position in the innovation-decision process will be influenced by prior conditions, perceived attributes of the innovation, decision-makers' personal characteristics, and communication channels.

Rogers (2003) summarized five important attributes of innovation that are positively related to an individual's attitude toward an innovation and their stage in the innovation-decision process. The five attributes are relative advantage, compatibility, complexity, trialability, and observability. Perceived attributes of an innovation would vary according to individual's different personal characteristics (such as age, gender, level of education, professional area, social status, and communication channels). People's different perceptions about attributes of an innovation would influence their adoption behavior. Based on their adoption behavior, Rogers' (2003) divided innovation adopters into five groups: innovators, early adopters, early majority, late majority, and laggards. Different categories of adopters have different characteristics according to their socioeconomic status, personality values, and communication behavior. Rogers' summarized generalizations for different categories.

Significance of the Study

If the study were carried out successfully, it would

1. Contribute to a better understanding WBDE at the China Agricultural University;

2. Provide better guidance for implementation of WBDE programs in the Chinese agricultural higher education system;
3. Enrich diffusion of innovation theory;
4. Provide a research model for other researchers about diffusion of WBDE in education systems.

Definitions of the Terms

Diffusion of Innovation: The process by which an innovation is communicated through certain channels over time among the members of a social system (Rogers, 2003, p. 11).

Distance Education: Planned learning that normally occurs in a different place and requires a well-defined system of delivery that includes modified teaching techniques, alternative modes for communication including, but not limited to technology, as well as alternative administrative and organizational components (Moore & Kearsley, 1996).

Innovation: An idea, practice or object that is perceived as new by an individual or other unit of adoption (Rogers, 2003).

Innovativeness: The degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system (Rogers, 2003).

The Innovation-Decision Process: The process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision (Rogers, 2003).

Web-based Distance Education: An educational method in which Web-based technologies (computer, Internet, electronic mail, multimedia technologies, etc.) are the main tools through which instructors and their students come together to accomplish a certain teaching and learning process over a certain period of time (Lindner, Murphy, & Dooley, 2002).

Limitations of the Study

Because implementing the WBDE program is still at its beginning stage in China and rapid development will be foreseen in the near future, the accuracy of this data may not hold true when faculty perceptions about WBDE change with increased knowledge and experiences. This study will be limited to Chinese Agricultural University. Therefore, results may not be applicable to other majors or in other countries.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this chapter is to provide a comprehensive review of literature on the development and diffusion of WBDE in higher education. This chapter is comprised of five major sections: model of the innovation-decision process; attributes of WBDE; diffusion of WBDE; barriers to diffusion of WBDE; and characteristics of adopter categories.

Model of the Innovation-Decision Process

According to the model of the innovation-decision process, an individual's adoption behavior about an innovation is not an instantaneous act, but a process that occurs over time, consisting of a series of actions and decisions (Rogers, 2003). The innovation-decision process can be influenced by prior conditions (previous practices, felt needs/ problems, innovativeness, and norms of the social systems), perceived attributes of the innovation (relative advantage, compatibility, complexity, trialability, and observability), characteristics of the decision-making unit (socioeconomic characteristics, personality variables, and communication), and communication channels. According to Rogers' (2003) model of five stages in the innovation-decision process, there are five stages in an innovation-decision process:

1. Knowledge, which occurs when an individual (or other decision-making unit) is exposed to an innovation's existence and gains some understanding of how it functions;

2. Persuasion, which occurs when an individual (or some other decision-making unit) forms a favorable or unfavorable attitude toward the innovation;
3. Decision, which occurs when an individual (or some other decision-making unit) engages in activities that lead to a choice to adopt or reject the innovation;
4. Implementation, which occurs when an individual (or some other decision-making unit) puts an innovation into use;
5. Confirmation, which occurs when an individual (or some other decision-making unit) seeks reinforcement of an innovation-decision already made, or reverses a previous decision to adopt or reject the innovation if exposed to conflicting messages about the innovation (p. 169).

Attributes of WBDE

According to Rogers' (2003) diffusion theory, there are five attributes of innovation: relative advantage, compatibility, complexity, trialability, and observability.

1. Relative advantage is "the degree to which an innovation is perceived as being better than the idea it supersedes" (p. 229). "The relative advantage of an innovation, as perceived by members of a social system, is positively related to its rate of adoption" (p. 233).
2. Compatibility is "the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters" (p. 240). "The compatibility of an innovation, as perceived by members of a social system, is positively related to its rate of adoption" (p. 249).

3. Complexity is "the degree to which an innovation is perceived as relatively difficult to understand and use" (p. 257). "The complexity of an innovation, as perceived by members of a social system, is negatively related to its rate of adoption" (p. 257).
4. Trialability (or called divisibility) is "the degree to which an innovation may be experimented with on a limited basis" (p. 258). "The trialability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption" (p. 258).
5. Observability is "the degree to which the results of an innovation are visible to others" (p. 258). "The observability of an innovation, as perceived by members of a social system, is positively related to its rate of adoption" (p. 258).

Moore and Benbasat (1991) developed an instrument to measure an individual's perceptions about the five attributes of an information and communication technology innovation. In the instrument, Moore and Benbasat renamed "complexity" as "ease of use." They also described "observability" by two aspects: demonstrability and visibility. Result demonstrability "concentrated on the tangibility of using the innovation, including their observability and communicability" (1991, p. 203). Visibility focused on the physical presence of the innovation in the organizational setting. Rogers (2003) valued highly the Moore and Benbasat instrument and recommended it as a good tool for future research in area of innovation diffusion.

As one of the latest educational innovations, WBDE has become more popular to the public in recent decades (Baer, 1999). Studies showed that WBDE would make a tremendous influence on the quality and quantity of distance education courses offered by universities (Birnbaum, 2001).

Advantages of WBDE include: using an existing infrastructure for course delivery; using available information technology with standard interfaces for communication; flexibility of online education; accessibility and convenience for students; institutional cost savings and time savings over traditional place-based education; and ease in updating and revision of courses for instructors (Hopey & Ginsburg, 1996; Kilian, 1997; Owston, 1997).

WBDE has provided students with opportunities to enroll in courses they may not have had the opportunity to take previously and allow schools to offer subjects for which they have no qualified teachers (Swan, 1992). “Barriers to accessing higher education learning opportunities are being reduced globally because of improving learning technologies” (Hanna, 1999, p. 19). Belcher (1997) mentioned that growth in graduate enrollment in distance education programs or certificates stems from the added advantage of course flexibility. Students can take courses from preferred locations that are convenient to their schedules. This advantage makes it possible for adult learners to accommodate their work schedules and to permit flexibility in managing their family life (Kember, Lai, & Murphy, 1994).

Diffusion of WBDE

In the United States

During the 1997-98 academic year, just over one third of the approximately 5,000 postsecondary institutions in the U.S. offered distance education courses, while another fifth planned to do so in the near future (U. S. Department of Education, National Center for Education Statistics, 1999). Lewis, Snow, Farris, and Levin (1999) found that, during the 1994 -1995 academic year, about 753,640 students were enrolled in distance education courses at two- and four-year institutions of higher education in the United States. By 1997-1998, the number was doubled, with over 1.3 billion students enrolling.

The 1999 annual Campus Computing Survey revealed that more college courses are using more technology resources compared with previous years (Green, 1999). In 1999, over 50& of all college courses make use of electronic mail, up from 40% in 1998 and 20% in 1995. The percentage of college courses using Web resources in the syllabus rose from 10 in 1995 and 30% in 1998 to 40 percent in 1999. More than two-thirds of the institutions in the 1999 survey provided online undergraduate application on their web sites, up from one-half in 1998. Three-fourths of surveyed institutions made the course catalog available online, compared to two-thirds in 1998. At this rate of growth, Green (1999) predicted that online undergraduate applications, online catalogs, and similar services would be available at essentially all universities in the near future. Web-supported instruction is becoming more commonplace in today's American colleges and universities (Lindner, Dooley, & Murphy, 2001).

In agricultural education, computers and the World Wide Web play an increasingly important role in providing powerful new resources for both educators and learners (Odell, 1994; O'Kane & Armstrong, 1997). Faculty members contended that electronic technologies used in distance education programs are very useful and important and would contribute to effective teaching in both graduate and undergraduate courses (Murphy, 1998). To prepare students successfully in Colleges of Agriculture, “educators must help all students become adept at distanced interaction, for skills of information gathering from remote sources and of collaboration with dispersed team members are as central to the future American workplace as learning to perform structured tasks quickly was to the industrial revolution” (Dede, 1996, p. 30).

In China

At the end of the 20^{th} century, China carried out a Remote Learning Program, in which Chinese first nationally funded the TCP/IP network, Chinese Educational and Research Network (CERNET), which was established to promote Advanced Distance Learning (ADL). CERNET connects 900 universities and one million computers in 100 cities. It is estimated that the coming decade will see all universities and higher education institutes, plus 40 thousand middle schools, with 56 million students in the system. The CERNET enables users to deliver distance education courses. It pioneered in China a completely new form of distance education, which is based on Internet and computers.

By 2002, 10% of Chinese universities and colleges had campus networks of 1000 M Ethernet backbone, 60% use various technologies (video, audio, and tele-conferencing), and still 30% have no campus networks. Under approval of the Ministry of Education, 67 universities have set up their network education colleges by February 2002. There are 606,000 students, 8 categories, 51 majors, 300+ courses, exchanging teaching programs through networks, bilateral or multi-party, between Chinese universities and foreign universities. WBDE programs in China include diploma programs (Bachelor, Master degrees, or professional degrees) and non-diploma programs (providing continuing education, training courses, or lifelong study).

In 1997, four leading universities (Tsinghua University, Zhejiang University, Beijing Postal and Telecommunications University, and Hunan University) began their pilot project in the area of two-way interactive tele-education. In 1998, Hunan University developed a multimedia software package for China’s first online-university project and the Chinese government was offering to sell the software package for $9.67 million. In 2001, WebCT, which is course management software that enables teachers to create online instructional modules by generating Web pages from data they enter into the program’s templates, was introduced to Tsinghua University in Beijing. In 2002, the Chinese government authorized 45 universities to offer Web-based degree and diploma programs through the Modern Distance Education Project. Currently China has 31 universities providing on-line learning to 50,000 distance education students (Liu, 2001).

Chinese WBDE programs at these 31 universities use dual-mode instruction. That means, two forms are used to teach and learn: (1) live transmissions directly from classrooms combined with interactive and on-line support; and (2) self-study materials supplemented with on-line discussions and tutorials. Teaching methods employed include (1) real-time teaching that uses multipoint video conferencing and data conferencing technology to implement interactive real-time teaching; (2) Web-based teaching that uses Web technology to provide distance learning; and (3) a combination of the two technologies.

Potter (2003) identified several trends in the development of Chinese WBDE programs: (1) collaboration in distance delivery between an academic institution and a private company; (2) establishment of extensive online support systems for distance students; (3) development of multi-media instructional packages.

Barriers to Diffusion of WBDE

Increased availability of distance education technologies does not mean effective adoption by educators and learners because teaching and learning in WBDE programs differs dramatically from that in a traditional classroom. The Boyer Commission (1998) reported that technology "can be expected to alter the manner of teaching at every educational level and in every conceivable setting [and] it is the role of universities to make technology positive" (p. 1). Wallhaus (2000) indicated that universities and colleges needed to modify methods in collecting data, recruiting students, and planning curriculum in WBDE programs. “The best teachers and researchers should be thinking about how to design courses in which technology enriches teaching rather than substitutes for it” (Boyer Commission, 1998, p. 2).

Faculty were seen as a core factor in the transformation from traditional education method to distance teaching methods (Moore & Kearsley, 1996; Olcott & Wright, 1995). However, faculty resistance is often listed as the major barrier keeping distance education technologies from being implemented (Dillon & Walsh, 1992). “Attitudinal issues---how people perceive and react to these technologies----are far more important now than structural and technical obstacles in influencing the use of technology in higher education” (McNeil, 1990, p. 2). As Miller and Shih (1999, p. 55) mentioned, “It is ultimately the faculty who will be responsible for delivering qualified off-campus instruction. Faculty cannot be expected to do this successfully without support, however…faculty are key stakeholders in the educational enterprise, and their concerns about off-campus courses must be addressed if off-campus degree programs are to be of high quality.”

Factors behind faculty members’ resistance to participation in WBDE could be situational, epistemological, philosophical, psychological, pedagogical, technical, social, and cultural (Espinoza, Whatley, & Cartwright, 1996; Garland, 1993; Galusha, n.d.; Kaye & Rumble, 1991; Lewis & Romiszowski, 1996; Sherritt, 1992; Sherry, 1996; Shklanka, 1990; Spodick, 1996). Numerous studies have been conducted related to faculty perceptions about barriers to diffusion of WBDE. Berge (1999) did a comprehensive study based on previous studies in the area of barriers to distance education and summarized the most frequently cited barriers to WBDE that include: concerns about time, concerns about incentives, WBDE program credibility, conflict with traditional education, technical expertise, and institutional support.

Concerns about Time

Lack of time for planning and developing distance education program is a big concern for faculty to develop Web-based courses (Betts, 1998; Clark, 1993; Olcott & Wright, 1995; Schifter, 2000). Rockwell, Schauer, Fritz, and Marx (1999) found lack of time and training as the biggest obstacles to adopting WBDE. Carl (1991) concluded that some educators resisted distance teaching because they were concerned that distance courses would significantly increase their workload and distance teaching may require more time for advanced planning and class enrollments may increase significantly. Murphy (1998) recommended that faculty who teach off-campus should have their workload adjusted to reflect the additional effort and the university should recognize their additional time and efforts.

Concerns about Incentives

Incentives that promote adoption of WBDE have been studied by numerous researchers (Clark 1993; Olcott & Wright 1995, Wolcott, 1997). Inadequate compensation and recognition for distance educators have consistently been identified as inhibitors for potential adopters. Edwards and Minich (1998) found that 44% of faculty teaching an interactive video course taught the course without additional compensation. They further noted that 51 of 64 respondents felt there was no recognition for their distance education efforts. The National Education Association (2000) found that overall faculty members did not receive additional compensation and that most received no reduction in course load. Johnson and DeSpain (2001) found that approximately 42% of surveyed colleges provided monetary or other consideration (e.g., release time) for faculty teaching distance education courses.

Inadequate compensation and recognition, however, may not be as important as intrinsic motivators in getting faculty involved in online education than extrinsic motivations. Wolcott (2001) investigated faculty beliefs on compensation and workload issues and concluded those faculty appear to be motivated more by intrinsic factors than extrinsic factors. Betts (1998) found intrinsic factors (e.g., intellectual challenge, personal motivation to use technology, or ability to reach new audiences that cannot attend classes on campus) and inhibiting factors (lack of release time, technical support, or faculty workload) have a greater influence on faculty participation in distance education than extrinsic factors (e.g., credit toward promotion and tenure, recognition and awards, or merit pay). Fredericksen, Pickett, Shea, Pelz, and Swan (2000) found that faculty who were motivated to try online teaching by interest in the Internet or online teaching rated experience more satisfying than faculty whose motivation was a fear of being left behind.

Schifter (2000, 2002) found that faculty who had taught online were more likely to name intrinsic motives (e.g., challenge, improve teaching) while those who had not named more extrinsic motives (e.g., requirement of department, support of administrators). Schifter also found administrators were more likely to name personal needs (e.g., release time, monetary reward) and extrinsic motivators as influential factors for faculty members’ participation behavior.

WBDE Program Credibility

Born and Miller (1999) found faculty members' greatest concerns about WBDE were the effectiveness of interactions and the overall quality of a Web-based degree. Research has shown that off-campus courses are often perceived to be of lower value than on-campus courses (Miller & Shih, 1999; Murphy, 1997; Olcott & Wright, 1995; Wolcott, 1996). Miller and Shih's (1999a) study about faculty assessment of the academic rigor of on- and off-campus courses concluded that teaching faculty in Colleges of Agriculture perceived off-campus courses to be less rigorous than on-campus courses and such perceptions were independent of their participation in faculty development programs related to distance education and their experience with distance teaching.

Research focusing on the comparison of traditional on-campus education programs and distance education programs indicated no significant difference in learning outcomes (Lockee, Burton, & Cross, 1999; Navarro & Shoemaker, 2000). Murphy (1997) noted "distance education can be as instructionally effective as any other well-designed instructional delivery method at providing particular kinds of instruction to particular audiences" (p. 7). Computer-based instructions have been shown to be effective in engineering, microbiology, anatomy, and medical education programs (Fasce, Ramirez, & Ibanez, 1995; Inglis, Fu, & Kwokchan, 1995; Jones & Kane, 1994; Tothcohen, 1995).

In a book entitled *The No Significant Difference Phenomenon*, Russell (1999) presented 355 studies showing that there is no significant difference between achievement of students who received instruction in a traditional classroom and those who received instruction through other means. Russell (1999) concluded that distance delivery, regardless of media or technology used, is not by itself a contributing variable in student achievement and the methods in properly designed learning environments can overcome geographical or chronological distance and produce no significant difference in learners' achievement.

Conflict with Traditional Education

Dillon and Walsh (1992) and Clark (1993) observed that faculty using distance education technology face a variety of challenges when adapting their teaching styles to a framework compatible with the distance-learning environment. Olcott and Wright (1995) proposed that, to use distance-learning strategies, faculty might need to alter teaching styles used within the "traditional classroom, " and develop new skills to effectively reach the distant learner.

An important difference between traditional education and online education lies in interaction and communication (Hillman, Willis, & Gunawardena, 1994; Moore, 1989; Zhang & Fulford, 1994). Increased use of computer and Internet-based communication technologies, such as electronic mail, online chat, and threaded discussion, is creating more communication channels for educators and learners. However, lack of person-to-person contact also challenges faculty members as well as learners who are involved in online education programs. Tobin (2001) concluded that distance education students and faculty must have good relationship skills. Poor relationship skills would result in problems, frustration, and failure for both teachers and students. Studies have shown that students' satisfaction and educational experience are related to interaction (Andrusyszyn, Iwasiw, & Goldenberg, 1999; Wright, Marsh, & Miller, 2000). Effective communication is found to be highly correlated with teacher effectiveness (Young & Shaw, 1999). Learners preferred a setting that includes interaction between and among other learners and instructors (Fulford & Zhang, 1993; Lindner, Dooley, & Kelsey, 2002).

Cain, Marrara, and Pitre (2003) also noted the timeliness and promptness of the instructor’s response is particularly important for students and instructor was also perceived as an important source of support for academic and administrative matters. Garland (1993) found that the major reasons distance education students withdrew from courses at a greater rate than traditional students were lack of adequate academic advising, poor tutor feedback, weak goal commitment, and fear of failure.

Technical Expertise

Willis (1995) found, to be good content providers and facilitators in online education programs, instructors need to have enough understanding of the delivery technology and to adjust teaching styles according to the changed teaching environment. Miller and Carr (1997) and Kotrlik, Redmann, Harrison, and Handley (2000) concluded that faculty valued information and had strong interest in information and training in areas of teaching techniques, models of effective teaching, principles of teaching, and designing instruction.

Studies has shown that faculty in some areas had inadequate general and specific knowledge and skill related to information technologies (Kotrlik, Redmann, Harrison, & Harndley, 2000). Faculty competence and confidence in using distance teaching technologies and methods are relatively low (Murphy & Terry, 1995, Murphy, 1998). Lack of enough technical expertise and lack of perceived institutional support (faculty rewards, incentives, training, etc.) for course conversion to distance education formats were found consistently by researchers (Dillon & Walsh, 1992; Dooley & Murphy, 2001; McNeil, 1990; Wolcott, 1996; Olcott & Wright, 1995). Lack of substantial support and lack of recognition of the time and effort expanded to develop multimedia course materials were cited frequently as concerns influencing faculty members' effective adoption of distance education programs (Clark, 1993; Murphy, 1998; Olcott & Wright 1995). Mirabito (1996) and Murphy (1998) found that lack of personnel resources in distance education during the implementation hindered the development of distance education. Garton and Chung (1996) reported that in-service training on the use of computers in classroom teaching was ranked 6th out of 50 in-service needs of agriscience teachers.

Institutional Support

Faculty have expressed concerns about loss of autonomy and control of the curriculum in WBDE (Clark, 1993; Olcott & Wright, 1995). Such concerns would become more obvious when faculty lack support from their organizations. Institutional support becomes more crucial in involving WBDE program in a traditional campus. As

Moore (1994) stated, “the barriers impeding the development of distance education are not technological, nor even pedagogical. We have plenty of technology, and we have a fair knowledge about how to use it. The major problems are associated with the organizational change, change of faculty roles, and change in administrative structures” (p. 4). Murphy (1997) also mentioned current institutional culture is not supportive of off-campus teaching.

Institutional support can be defined as favorable policies for distance education faculty members’ effort. Meyer (2002) found that various policies on faculty compensation, workload, intellectual property, and geographic service areas influenced student enrollment in distance education. Faculty members have an expressed concern about intellectual property of online courses (Edwards & Minich, 1998; Johnson & DeSpain, 2001). Edwards and Minich (1998) found that ownership of distance education courses varies from institutions owning the ownership of distance education courses (45%), to faculty owning (11%), to sharing ownership between faculty and institutions (24%). Johnson and DeSpain (2001) found that only 40% of organizations surveyed had a formal intellectual property policy on ownership of distance education courses.

Barriers in China

Potter (2003) summarized several challenges facing China’s WBDE: (1) cost of education; (2) lack of infrastructure, inadequate bandwidth, inadequate access to computers, and inadequate software; (3) lack of locally produced software; (4) online centers are not yet efficiently managed; (5) many distance education teachers lack specific training; and (6) a relatively small number of students actually graduate from distance education programs. Higher education is expensive and higher education utilizing digital technologies is even more expensive. At ¥5000 (about US$604) per year, university tuition is almost equal to the average annual income of urban workers (¥6000, which is about US$725) and is 2.5 times the average annual income in rural China. Internet access is expensive. Most Chinese citizens, particularly those who would most benefit from distance education, cannot afford it. The 37% of Chinese citizens, who live in rural areas and are in most need of educational reform, have the least capacity to use it.

Edwards, Zou, Cragg, and Song (2000) identified six problems facing Chinese WBDE: (1) use of different technologies by various universities; (2) few government regulations for distance education; (3) limited financial resources and limited technical support for distance education; (4) students who participate in distance education courses generally take the same set of examinations as students in face-to-face classrooms; (5) only a few universities offer courses on-line; and (6) limited access of students to computers and internet connections.

Ding (2002) found that challenges for Information Communication Technology (ICT) education in China included: (1) insufficient infrastructure of ICT for education and digital divide; (2) development and sharing of educational resources; and (3) teachers were not ready for ICD-based instruction. Ding mentioned the major challenge was that teachers were not ready. Barriers to adopt ICT education included: (1) inertia and resistance to ICT education; (2) unfavorable policies from governments and institutions in rewarding and promoting; (3) improper and imperfect structure of knowledge and skills on the side of teachers; (4) insufficient supports (financial, technical, human resources) from institutions; (5) cultural and pedagogical conflicts; and (6) need for training of instructional design for ICT-based instruction and learning.

Fan (2001) concluded that major barriers to Internet adoption in China included: (1) poor speed and expensive access to information infrastructure and services; (2) local content and information in Chinese; (3) problem of poverty; and (4) human resources factors. In 2001, an Internet-ready PC cost about US$1000 in China; however, GDP per capita was US$680 in China in 1999. Currently only 12 in every 1000 Chinese possess a computer (Potter, 2003). Individual Web-based study is still not possible for most people (Potter, 2003). About 70% of the Chinese population lives in rural area where Internet service does not reach and incomes of most ($680) are on average lower than in the United States. Purchasing a computer is beyond most rural people's capacity.

In China, 86.2% of Internet users use dial up modern, 7% ISDN, 1.5% ADSL, 0.8% Cable Modern, 4% leased line and less than 0.5% use other methods such as LMDS and Satellite (China Center for Information Industry, 2001). Internet service is relatively expensive in China. The price for dial-up Internet users contains telephone charges and Internet usage charges. Currently, the average Internet charges are about 2 RMB/hr. The telephone charges vary from a rate of 1.2 RMB/hr to 9.3 RMB/hr (Beijing Information Harbor, 2001). The average cost for full international access option users is about US$25 for 50 hours from ChinaNET at 56Kbps link, compared to the cost of US$24.95 for an American user with 150 hours from UUNET at same speed connection

(UUNET, 2001). The average cost for a leased line user is about US$1,600/month from CHINAGBN at 128Kbps, US$10,000 at 2Mbps (Jitong, 2001).

The Internet Service Providers (ISPs) access to interconnecting Networks is relatively expensive in China. China Telecom charges international half-circuits at the rate of US$73,000/month for 2Mbps, compared to US$22,000 in the United States. A flat monthly fee for a leased line is about US$300 in China, compared to US$100 in the United States. Higher prices from carriers directly translate into higher prices for consumers, which in turn retard the Internet's expansion (Fan, 2001, p. 12).

The reason for expensive Internet access is that Chinese basic telecommunication service providers are state-owned and controlled by government (Figure 1). OECD experience indicates that where competition is most advanced, there is highly developed Internet access (Fan, 2001). The six carriers who provide transmission capacities in China are in charge of different service and do not compete with each other (Table 2).

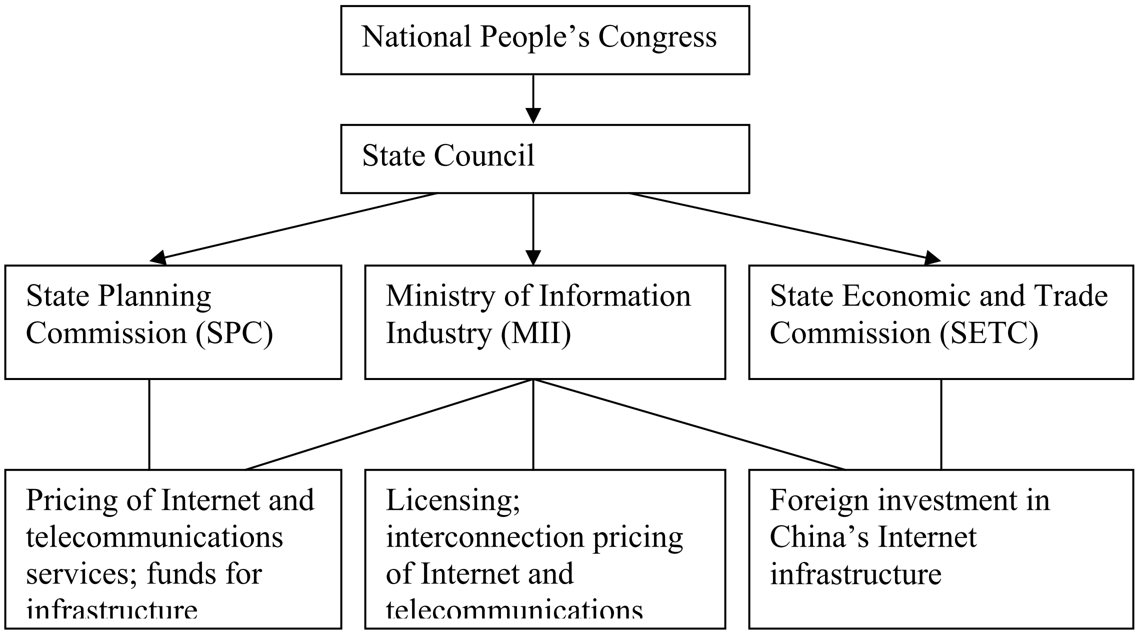

Figure 1. Policy and Regulatory Authority in China (Source: Adapted from Lovelock, 1999)

Table 2
Services Provided by Each Operator

	Scope of Service						
	Fixed line						
Organization	Local	Long distance	International	Cellular	Data & Internet Service	Satellite	Paging
China Telecom	Yes	Yes	Yes		Yes		
China Unicom		Yes	Yes	Yes	Yes	Yes	Yes
JiTong Telecom					Yes	Yes	
China Satellite						Yes	
China Mobile				Yes	Yes		
China Netcom					Yes		

Source: Adopted from Fan (2001).

Characteristics of Adopter Categories

According to Rogers' (2003) adopter categories, innovation adopters may be categorized into five groups: (1) innovators who are the first 2.5% of the individuals in a system to adopt an innovation; (2) early adopters who are the next 13.5% to adopt the innovation; (3) early majority who are the next 34% of the adopters; (4) late majority who are the next 34% to adopt the innovation; and (5) laggards, who are the last 16% to adopt the innovation (p. 280-281). Different categories of adopters have different characteristics according to their socioeconomic status and personalities:

1. Earlier adopters are not different from later adopters in age;
2. Earlier adopters have more years of formal education than later adopters;
3. Earlier adopters have higher social status than later adopters;
4. Earlier adopters have larger units (farms, schools, companies, and so on) than later adopters;
5. Earlier adopters have greater knowledge of innovations than later adopters (Rogers, 2003, p. 288-291).

Personal Characteristics

Other studies found potential adopters' personal characteristics influenced their perceptions and their adoption about WBDE. Miller and Miller (2000) did a study about appropriateness of a telecommunication network in Iowa to deliver different agricultural curriculum areas and they found curriculum areas with highest rate of appropriateness were agricultural economics and agricultural marketing, followed by job getting and keeping skill, agricultural sales and service, leadership, entrepreneurship, animal science, natural resources, food science, agricultural production, plant and crop science, biotechnology, horticulture, and agricultural mechanics. Miller and Miller (2000) concluded that curriculum areas that had laboratory, shop, or other hands-on activities were rated as not appropriate for telecommunication network delivery.

Schifter (2000) found that faculty members' gender, age, academic rank, and tenure status had no significant effect on the level of faculty participation in distance education programs. Born and Miller (1999) found that there was no correlation between faculty members' academic rank and their perceptions of WBDE; however, distance education experience influenced significantly faculty perceptions about WBDE. Perceptions of WBDE would be significantly higher for faculty with distance education experience.

Schifter (2000) found that faculty members' gender, age, academic rank, and distance education experience would significantly influence their perceptions about motivating and inhibiting factors for participating in distance education. Faculty perceptions about seventeen motivating factors (graduate training received, requirement by department, support and encouragement from the Dean or Chair, job security, expectation by university that faculty participate, opportunity to develop new ideas, visibility for jobs at other institutions/organizations, support and encouragement from departmental colleagues, technical support provided by the institution, career exploration, credit toward promotion and tenure, release time, distance education training provided by the institution, greater course flexibility for students, opportunity to diversify program offerings, opportunity to improve teaching, and support and encouragement from institutional administrators) and eight inhibiting factors (lack of distance education training provided by the institution, lack of support and encouragement from department colleges, lack of technical background, lack of support and encouragement from dean or chair, lack of grants for materials/expenses, concerns about quality of courses, lack of technical support provided by the institution, and lack of credit toward promotion and tenure) differed significantly by gender. Female faculty were more concerned about each one of these factors than were male faculty.

Faculty perceptions about three motivating factors (visibility for jobs at other institutions/organizations, career exploration, and credit toward promotion and tenure) and four inhibiting factors (lack of grants for materials, lack of monetary support for participation, lack of salary increase, and lack of credit toward promotion and tenure) differed significantly by age. Faculty who were under 30 were more concerned about these factors than were older faculty, except for “lack of grants for materials/expenses,” “lack of monetary support for participation” and “lack of salary increase.”

Faculty perceptions about nine motivating factors (graduate training received, opportunity for scholarly pursuit, job security, visibility for jobs at other institutions/organizations, support and encouragement from departmental colleagues, career exploration, credit toward promotion and tenure, release time, and support and encouragement from institutional administrators) and one inhibiting factor (lack of credit toward promotion and tenure) differed significantly by academic rank. Assistant professors or instructors were more likely to be motivated or inhibited by those factors than were associate and full professors.

Faculty perceptions about eight motivating factors (personal motivation to use technology, reduced teaching load, monetary support for participation, technical support provided by the institution, career exploration, release time, and distance education training provided by the institution) and one inhibiting factor (lack of support and encouragement from institution administrators) differed significantly by distance education experience. Faculty with distance education experience rated intrinsic motivators higher, while faculty without distance education experiences rated personal needs, extrinsic motivators, and inhibitors higher.

Conceptual Framework of the Study

The conceptual framework for this study is depicted in Figure 2, and it is based on the assumption that limited access to higher education by students is a problem for Chinese institutions of higher education.

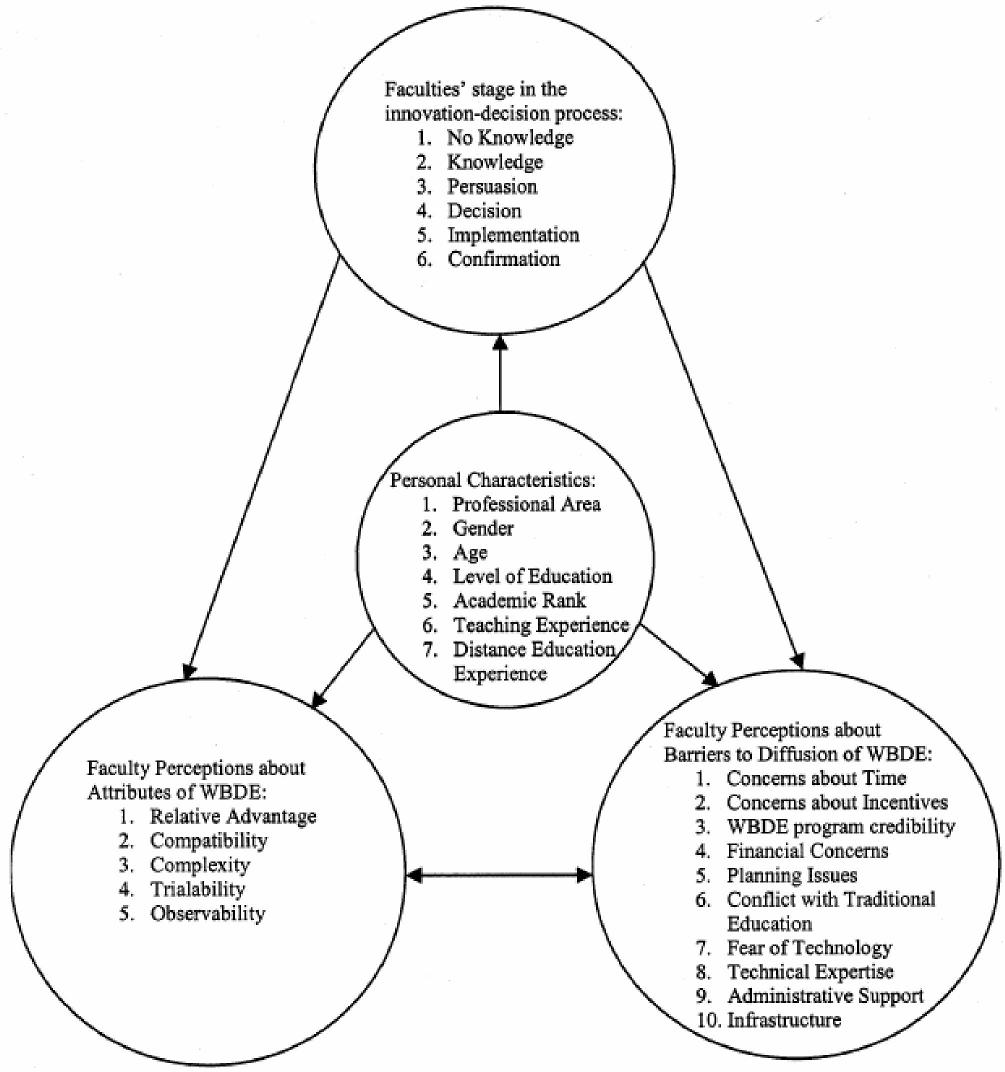

Figure 2. Conceptual Framework of the Study

CHAPTER III

METHODOLOGY

The type of research, pilot test, selection of respondents, instrumentation, validity and reliability, data collection, and data analysis are described in this chapter.

For the objective of the study, Web-based distance education (WBDE) is defined as an educational method in which Web-based technologies (computer, Internet, electronic mail, multimedia technologies, etc.) are the main tools through which instructors and their students come together to accomplish a certain teaching and learning process over a certain period of time.

Type of Research

The research design of this study was descriptive and correlational in nature. The study was designed to examine China Agricultural University faculty perceptions about attributes and barriers impacting diffusion of WBDE. The theoretical framework for this study was based on: (1) Rogers' (2003) model of the innovation-decision process, (2) Rogers' (2003) attributes of innovation theory; (3) Rogers' (2003) characteristics of adopter categories; (4) Moore and Benbasat's (1991) measurements of the attributes of innovation, and (5) Berge's (1999) study about barriers to distance education.

The study has sixteen dependent variables and seven independent variables. One dependent variable was faculty members' stage in the innovation-decision process. The other fifteen dependent variables could be categorized into two groups. The first group includes faculty perceptions about five attributes of WBDE: relative advantage, compatibility, complexity, trialability, and observability. The second group of dependent variables includes faculty perceptions about ten barriers to diffusion of WBDE: concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure. The seven independent variables were professional area, gender, age, educational level, academic rank, teaching experiences, and distance education experience.

Due to the sensitivity of human research, Texas A&M University Institutional Review Board (IRB) approval was needed to start the survey process. IRB approval was requested for the survey instrument (2003-0445) and granted on September 25, 2003 (Appendix A).

Pilot Test

A pilot study was performed with faculty from the Department of Agricultural Education at Texas A&M University. This group was not part of the sample population. Random sample procedures were used for the pilot study and 20 faculty were randomly selected to participate in the pilot study. A pilot cover letter (Appendix B) and pilot instrument was sent to each participant on June 27, 2003 and data collection ceased on July 11, 2003 with 12 (60%) respondents. Reliability for the instrument was estimated by calculating a Cronbach's alpha coefficient. Table 3 shows reliability of each item of perceived attributes and perceived barriers impacting diffusion of WBDE: relative advantage, r=0.74; compatibility, r=0.42; complexity, r=0.83; trialability, r=0.90;

observability, *r*=0.78; faculty concerns about comprehension and time, *r*=0.63; WBDE program credibility, *r*=0.65; financial concerns, *r*=0.77; planning issues, *r*=0.76; conflict with traditional education, *r*=0.73, fear of technology, *r*=0.73; technical expertise, *r*=0.84; administrative, *r*=0.78; and infrastructure, *r*=0.70.

Table 3
Reliability of Dependent Variables in the First Pilot Test

Items	*r*
Attributes of WBDE	
1. Relative advantage	0.74
2. Compatibility	0.42
3. Complexity	0.83
4. Trialability	0.90
5. Observability	0.78
Barriers to diffusion of WBDE	
1. Faculty concerns about compensation and time	0.63
2. WBDE program credibility	0.65
3. Financial concerns	0.77
4. Planning issues	0.76
5. Conflict with traditional education	0.73
6. Fear of technology	0.73
7. Technical expertise	0.84
8. Administrative support	0.78
9. Infrastructure	0.70

Because results indicated that three dependent variables---perceived compatibility of WBDE, concerns about compensation and time as a perceived barrier to diffusion of WBDE, and WBDE program credibility as a perceived barrier to diffusion of WBDE --- had relatively low reliabilities, a second pilot study was conducted after reconstituting these sections of the questionnaire. The variable “faculty concerns about compensation and time” was split into two variables: concerns about time and concerns about incentives. Another pilot cover letter (Appendix B) and revised pilot instrument was sent to 20 randomly selected faculty on July 14 and data collection ceased on July 17, 2003 with 11 (55%) respondents. A new reliability test was conducted by recalculating Cronbach's alpha coefficient on supplementary data. Table 4 shows the reliabilities of the revised items: compatibility, *r*=0.92; concerns about time, *r*=0.89; concerns about incentives, *r*=0.95; and WBDE program credibility, *r*=0.94.

Table 4
Reliability of Revised Items

Items	*r*
Attributes of WBDE	
1. Compatibility	0.92
Barriers to diffusion of WBDE	
1. Concerns about time	0.89
2. Concerns about incentives	0.95
3. WBDE program credibility	0.94

Reliability for faculty perceptions about attributes of WBDE was *r*=0.84. Reliability for faculty perceptions about barriers to diffusion of WBDE was *r*=0.78.

Selection of Respondents

The target population for this study were faculty at the China Agricultural University (*N*=1170). Among the 1170 faculty, about 70 faculty were participating in WBDE programs and 1100 faculty were not currently involved in WBDE programs. Random and stratified sampling was used for the study (Gall, Gall, & Borg, 2003). The sample number was derived by using the table of "Determining Sample Size for

Research Activities" (Krejcie & Morgan, 1970). Fifty faculty who were involved in WBDE programs and 250 faculty who were not involved in WBDE programs were randomly drawn from across the China Agricultural University.

Instrumentation

The research instrument (English and Chinese versions, Appendix F) consisted of a four-part questionnaire, which was designed based on the review of literature (Berge, 1999; Moore & Benbasat, 1991; Rogers, 2003). The first part of the instrument was designed to measure participants' stage in the innovation-decision process related to WBDE. Rogers' (2003) model of the innovation-decision process was adopted and modified as the theoretical base for this part. Besides the five stages (knowledge, persuasion, decision, implementation, and confirmation) mentioned in the model, another stage named "no knowledge" was added as the first stage in the innovation-decision process. Participants were asked to indicate their attitudes toward the statement "Limited access to higher education by students is a big problem for Chinese institutions of higher education" by choosing "I agree," "I disagree," or "I am not sure." Six statements were used to indicate participants' current stage (no knowledge, knowledge, persuasion, decision, implementation, or confirmation) in the innovation-decision process related to WBDE. The participants were asked to select one statement that best reflected their current stage in the process. The level of measurements for these two questions was nominal.

The second part was designed to measure participants' perceptions about attributes of WBDE. Rogers' (2003) attributes of innovation (relative advantage, compatibility, complexity, trialability, and observability) were used as the theoretical base for the part. Moore and Benbasat's (1991) measurements of the main attributes of innovation were used and modified as the instrumental base for this part. Participants were asked to indicate their perceptions about the five attributes of WBDE by responding to a series of statements on a five-point Likert-type scale. The points on the scale were: 1=Strongly Disagree (SD); 2=Disagree (D); 3=Neutral (N); 4=Agree (A); and 5=Strongly Agree (SA). The level of measurement for these variables was interval.

The third part of the instrument was designed to measure participants' perceptions about barriers to diffusion of WBDE. Based on Berge's (1999) study about barriers to distance education, ten barriers were summarized as the major barriers to diffusion of WBDE. These barriers included: concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, fear of technology, conflict with traditional education, technical expertise, administrative support, and infrastructure. Participants were asked to indicate their perceptions about the ten barriers by responding to a series of statements on a five-point Likert-type scale. The points on the scale were: 1=No Barrier (NB); 2=Weak Barrier (WB); 3=Moderate Barrier (MB); 4=Strong Barrier (SB); and 5=Very Strong Barrier (VSB). The level of measurement for these variables was interval.

The fourth part of the instrument was designed to gather data on participants' personal characteristics. Rogers' (2003) characteristics of adopter categories were used as the theoretical base for this part. Professional area was measured as the college to which a participant belongs. The level of measurement for professional area was nominal. Gender was measured as either male or female. The level of measurement for gender was nominal. Age was measured as the number of years since birth. The level of measurement for age is ratio. Level of education was measured as bachelor, master, or doctoral degree. The level of measurement for level of education was ordinal. Academic rank was measured as follows: associate professor, professor, or faculty with other titles. The level of measurement for academic rank was ordinal. Teaching experience was measured by the number of years for which participant has been teaching at the university level. The level of measurement for teaching experience was interval. Distance education experience related to WBDE program, TV or broadcasting distance program, correspondence program, or others was measured by "yes" or "no" choices. The level of measurement for distance education experience was nominal. If participant replied "yes," the length of using each distance education program was measured by the number of years for which participant has been using the program. The level of measurement for length of distance education experience was interval.

Validity and Reliability

The instrument was tested for content and face validity by a panel of experts consisting of faculty who have expertise in adoption/diffusion research (Appendix C). Experts' review about the instrument for content and face validity controlled for internal validity and measurement error. Wording and adjusting of the instrument was made based on feedbacks from the expert panel.

Responses from randomly selected faculty members in the Department of Agricultural Education, Texas A&M University, were used to test for reliability using Cronbach's Alpha coefficient. Reliability for faculty perceptions about attributes of WBDE was r=0.84. Reliability for faculty perceptions about barriers to diffusion of WBDE was r=0.78. Comparisons of early versus late respondents were conducted to evaluate whether nonresponse would be a threat to external validity of the survey (Lindner, Murphy, & Briers, 2001).

To understand the research topic better in Chinese circumstances, Dr. Gao Qijie, a professor from the Center for Extension and Innovation Management, China Agricultural University, was invited as Ad Hoc advisor for the study (Appendix D). Dr. Gao reviewed both English and Chinese survey instruments and made some corrections for the instrumentation.

Data Collection

Data were collected by in-person delivered survey. Starting from December 8, 2003, the questionnaire, together with a cover letter (Appendix E), was delivered to randomly selected sample faculty at the China Agricultural University. The sample faculty included 50 faculty with WBDE experience and 250 faculty without WBDE experience. Participants were asked to fill in the questionnaire in their spare time and the researcher picked up the questionnaires after they were finished. Participants were assured that their responses were confidential and only group data would be reported. The questionnaires were coded for convenient analysis. Non-respondents were reminded after five days' non-response. Data collection ceased on January 2, 2004. A total response rate of 96.3% (*n*=289) was obtained. Of the surveys returned, 16 were incomplete, resulting in a usable response rate of 91% (*n*=273) for the study.

Comparing early versus late responses controlled for non-response error. Late responses were compared to early responses on faculty members' attitude toward the statement "limited access to higher education by students is a big problem for Chinese institutions of higher education," faculty members' stage in the innovation-decision process, faculty perceptions about attributes of WBDE, and faculty perceptions about barriers to diffusion of WBDE. No significant difference was found, which means the results of the study could be generalized to the target population (Lindner, Murphy, & Briers, 2001).

Data Analysis

The collected data were analyzed using the Statistical Package for Social Sciences (SPSS, 11.0). Alpha for all statistical procedures was set *a priori* at .05.

Objective 1

The first objective was to describe faculty by selected personal characteristics. The variables faculty members' personal characteristics (professional area, gender, age, level of education, academic rank, teaching experience, and distance education experience) were analyzed and described by calculating frequencies and percentages by level of response.

Objective 2

The second objective was to describe faculty by their current stage in the innovation-decision process related to WBDE (no knowledge, knowledge, persuasion, decision, implementation, and confirmation). The variable faculty members' current stage in the innovation-decision process (no knowledge, knowledge, persuasion, decision, implementation, and confirmation) was analyzed and described by calculating frequencies and percentages by level of response.

Objective 3

The third objective was to describe faculty according to their perceptions about attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability). The variables faculty perceptions about attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability) were analyzed and described by calculating a summative cumulative faculty perceptions mean. The separate statements were summed and their average mean was used in the analysis in an attempt to increase the reliability of the measurement (Hair, Anderson, Tatham, & Black, 1998). The variables faculty perceptions about attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability) were analyzed and described by calculating frequencies and percentages by level of response. Interpretations for faculty perceptions about attributes of WBDE were based on scales: 1~1.5=strongly disagree; 1.51~2.5=disagree; 2.51~3.5=neutral; 3.51~4.5=agree; and 4.51~5.0=strongly agree.

Objective 4

The fourth objective was to describe faculty according to their perceptions about barriers to diffusion of WBDE (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure). The variables faculty perceptions about barriers to diffusion of WBDE (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure) were analyzed and described by calculating a summative cumulative faculty perceptions mean. The separate statements were summed and their average mean was used in the analysis in an attempt to increase the reliability of the measurement (Hair, Naderson, Tatham, & Black, 1998). The variables faculty perceptions about barriers to diffusion of WBDE (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure) were analyzed and described by calculating frequencies and percentages by level of response. Interpretations for faculty perceptions about barriers to diffusion of WBDE were based on scales: 1~1.5=no barrier; 1.51~2.5=weak barrier; 2.51~3.5=moderate barrier; 3.51~4.5=strong barrier; and 4.51~5.0=very strong barrier.

Objective 5

The fifth objective was to examine the relationship between faculty members' selected personal characteristics and their stages in the innovation-decision process. To assess the magnitude of statistical differences, effect sizes were calculated, interpreted, and reported (Cohen, 1988). Interpretations for *t*-tests were based on the Cohen Conversion: negligible size, $d<0.20$; small effect size, $0.50>d \geq 0.20$; medium effect size, $0.80>d \geq 0.50$; and large effect size, $d \geq 0.80$. Interpretations for ANOVA were based on the Cohen Conversion: negligible size, $f<0.10$; small effect size, $0.25>f \geq 0.10$; medium effect size, $0.40>f \geq 0.25$; and large effect size, $f \geq 0.40$.

The variables faculty members' selected personal characteristics (professional area, age, level of education, academic title, and teaching experience) and their stage in the innovation-decision process were analyzed and described by calculated mean, standard deviation and analysis of variance by level of response, and computing the degrees of freedom.

The variables faculty members' selected personal characteristics (gender and distance education experience) and their stage in the innovation-decision process were analyzed and described by calculated mean, standard deviation and *t*-test by level of response, and computing the degrees of freedom.

Objective 6

The sixth objective was to examine the relationship between faculty members' selected personal characteristics and their perceptions about attributes of WBDE. To assess the magnitude of statistical differences, effect sizes were calculated, interpreted, and reported (Cohen, 1988). Interpretations for *t*-tests were based on the Cohen Conversion: negligible size, $d<0.20$; small effect size, $0.50>d \geq 0.20$; medium effect size, $0.80>d \geq 0.50$; and large effect size, $d \geq 0.80$. Interpretations for ANOVA were based on the Cohen Conversion: negligible size, $f<0.10$; small effect size, $0.25>f \geq 0.10$; medium effect size, $0.40>f \geq 0.25$; and large effect size, $f \geq 0.40$.

The variables faculty members' selected personal characteristics (professional area, age, level of education, academic title, and teaching experience) and their perceptions about attributes of WBDE were analyzed and described by calculated mean, standard deviation and analysis of variance by level of response, and computing the degrees of freedom.

The variables faculty members' selected personal characteristics (gender and distance education experience) and their perceptions about attributes of WBDE were analyzed and described by calculated mean, standard deviation and *t*-test by level of response, and computing the degrees of freedom.

Objective 7

The seventh objective was to examine the relationship between faculty members' selected personal characteristics and their perceptions about barriers to diffusion of

WBDE. To assess the magnitude of statistical differences, effect sizes were calculated, interpreted, and reported (Cohen, 1988). Interpretations for *t*-tests were based on the Cohen Conversion: negligible size, $d<0.20$; small effect size, $0.50>d\geq0.20$; medium effect size, $0.80>d\geq0.50$; and large effect size, $d\geq0.80$. Interpretations for ANOVA were based on the Cohen Conversion: negligible size, $f<0.10$; small effect size, $0.25>f\geq0.10$; medium effect size, $0.40>f\geq0.25$; and large effect size, $f\geq0.40$.

The variables faculty members' selected personal characteristics (professional area, age, level of education, academic title, and teaching experience) and their perceptions about barriers to diffusion of WBDE were analyzed and described by calculated mean, standard deviation and analysis of variance by level of response, and computing the degrees of freedom.

The variables faculty members' selected personal characteristics (gender and distance education experience) and their perceptions about barriers to diffusion of WBDE were analyzed and described by calculated mean, standard deviation and *t*-test by level of response, and computing the degrees of freedom.

Objective 8

The eighth objective was to examine the relationship between faculty members' stage in the innovation-decision process and their perceptions about attributes of WBDE. To assess the magnitude of statistical differences, effect sizes were calculated, interpreted, and reported (Cohen, 1988). Interpretations for *t*-tests were based on the Cohen Conversion: negligible size, $d<0.20$; small effect size, $0.50>d\geq0.20$; medium effect size, $0.80 > d \geq 0.50$; and large effect size, $d \geq 0.80$. Interpretations for ANOVA were based on the Cohen Conversion: negligible size, $f < 0.10$; small effect size, $0.25 > f \geq 0.10$; medium effect size, $0.40 > f \geq 0.25$; and large effect size, $f \geq 0.40$.

The variables faculty members' stage in the innovation-decision process and their perceptions about attributes of WBDE were analyzed and described by calculated mean, standard deviation and analysis of variance by level of response, and computing the degrees of freedom.

Objective 9

The ninth objective was to examine the relationship between faculty members' stage in the innovation-decision process and their perceptions about barriers to diffusion of WBDE. To assess the magnitude of statistical differences, effect sizes were calculated, interpreted, and reported (Cohen, 1988). Interpretations for *t*-tests were based on the Cohen Conversion: negligible size, $d < 0.20$; small effect size, $0.50 > d \geq 0.20$; medium effect size, $0.80 > d \geq 0.50$; and large effect size, $d \geq 0.80$. Interpretations for ANOVA were based on the Cohen Conversion: negligible size, $f < 0.10$; small effect size, $0.25 > f \geq 0.10$; medium effect size, $0.40 > f \geq 0.25$; and large effect size, $f \geq 0.40$.

The variables faculty members' stage in the innovation-decision process and their perceptions about barriers to diffusion of Web-based distance were analyzed and described by calculated mean, standard deviation and analysis of variance by level of response, and computing the degrees of freedom.

Objective 10

The tenth objective was to examine the relationship between faculty perceptions about attributes of WBDE and their perceptions about barriers to diffusion of WBDE.

The variables faculty perceptions about attributes of WBDE and their perceptions about barriers to diffusion of WBDE were measured by correlational analysis and finally indicated by measures of association and statistical significance. Measures of association were indicated by Pearson's Product-Moment coefficient of correlation. This method is appropriate when the variables to be correlated are normally distributed and measured on an interval or ratio scale (Ary, Jacobs, & Razavieh, 1996). Table 5 shows the magnitudes of relationships (Davis, 1971).

Table 5
Magnitude of Correlation Coefficient

Coefficient	Description
0.70 or higher	Very Strong Association
0.50 to 0.69	Substantial Association
0.30 to 0.49	Moderate Association
0.10 to 0.29	Low Association
0.01 to 0.09	Negligible Association

CHAPTER IV

ANALYSIS OF DATA

This chapter presents the results of data analysis. Population response, comparison of early versus late respondents, and findings related to each of the ten objectives are summarized.

Population Response

Faculty at the China Agricultural University (*N*=1170) were the target population for the study. A sample of 50 faculty were randomly selected among the 70 faculty who had WBDE experience. A sample of 250 faculty were randomly selected among the 1100 faculty who had not WBDE experience. Table 6 shows 289 (96.3%) faculty responded during December 8, 2003 – January 2, 2004. Of these responses, 273 were usable, resulting in a usable response rate of 91%. Among the 273 faculty, 47 were faculty had WBDE experience and 226 were faculty who had not WBDE experience.

Table 6
Response Population to Questionnaire

Faculty without WBDE experience	*f*	%
Respondents, complete	226	90.4
Respondents, incomplete	16	6.4
Nonrespondents	8	3.2
Total	250	100
Faculty with WBDE experience	*f*	%
Respondents, complete	47	94
Respondents, incomplete	0	0
Nonrespondents	3	6
Total	50	100

Comparison of Early versus Late Respondents

Comparisons of early versus late respondents were conducted to evaluate whether nonresponse would be a threat to external validity of the survey by using the second method recommended by Lindner, Murphy, and Briers (2001). The first wave of responses (n=136) was received between December 8, 2003 and December 16, 2003 and the second wave of responses (n=137) was received between December 17, 2003 and January 2, 2004. Table 7 shows no significant difference was found between early and late respondents related to statement: "Limited access to higher education by students is a big problem for Chinese institutions of higher education," t (268)=0.43, p>0.05.

Table 7
Early versus Late Response to Statement "Limited access to higher education by students is a big problem for Chinese institutions of higher education"

Returned Status	*n*	*M*	*SD*	*t*	*p*
Attitude					
Early	136	1.35	0.64	0.43	0.43
Late	134	1.42	0.70		

Note: three participants chose not to respond to this question; 1=I agree. 2=I disagree. 3=I am not sure.

Table 8 shows that no significant difference was found between early and late respondents related to faculty members' stage in the innovation-decision process, t (266)=0.80, p>0.05.

Table 8
Early versus Late Response to Stage in the Innovation-decision Process

Returned Status	*n*	*M*	*SD*	*t*	*p*
Faculty members' stage in the Innovation-decision Process					
Early	135	2.91	1.47	0.80	0.80
Late	133	2.95	1.37		

Note: 1=no knowledge, 2=knowledge, 3=persuasion, 4=decision, 5=implementation, 6=confirmation

Table 9 shows that no significant difference was found between early and late respondents related to faculty perceptions about attributes of WBDE: relative advantage, t (271)=0.85, p>0.05; compatibility, t (271)=0.24, p>0.05; complexity, t (271)=0.26, p>0.05; trialability, t (269)=0.14, p>0.05; and observability, t (271)=0.34, p>0.05.

Table 9
Early versus Late Response to Attributes of WBDE

Returned Status	*n*	*M*	*SD*	*t*	*p*
Relative Advantage					
Early	136	3.83	0.64	0.85	0.85
Late	137	3.85	0.62		
Compatibility					
Early	136	3.87	0.60	0.24	0.24
Late	137	3.95	0.54		
Complexity					
Early	136	3.73	0.65	0.26	0.26
Late	137	3.82	0.60		
Trialability					
Early	135	3.96	0.64	0.14	0.14
Late	136	4.06	0.56		
Observability					
Early	136	3.97	0.52	0.34	0.34
Late	137	4.04	0.55		

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Table 10 shows that no significant difference was found between early and late respondents related to faculty perceptions about barriers to diffusion of WBDE: concerns about time, t (269)=0.44, p>0.05; concerns about incentives, t (269)=0.31, p>0.05; WBDE program credibility, t (269)=0.87, p>0.05; financial concerns, t (263)=0.11, p>0.05; planning issues, t (269)=0.08, p>0.05; fear of technology, t (271)=0.35, p>0.05; conflict with traditional education; t (271)=0.27, p>0.05; technical expertise, t (270)=0.74, p>0.05; administrative support, t (269)=0.29, p>0.05; and infrastructure, t (271)=0.48, p>0.05.

Table 10
Early versus Late Response to Barriers to WBDE

Returned Status	*n*	*M*	*SD*	*t*	*p*
Concerns about Time					
Early	134	2.89	1.04	0.44	0.44
Late	137	2.80	1.03		
Concerns about Incentives					
Early	135	2.81	0.95	0.31	0.31
Late	136	2.69	0.92		
WBDE Program Credibility					
Early	135	3.13	1.05	0.87	0.87
Late	136	3.15	0.99		
Financial Concerns					
Early	133	2.96	0.89	0.11	0.11
Late	132	2.79	0.87		
Planning Issues					
Early	135	3.00	1.00	0.08	0.08
Late	136	2.80	0.90		
Fear of Technology					
Early	136	2.62	0.96	0.35	0.35
Late	137	2.52	0.91		
Conflict with Traditional Education					
Early	136	2.64	0.93	0.27	0.27
Late	137	2.52	0.90		

Table 10 Continued

Returned Status	*n*	*M*	*SD*	*t*	*p*
Technical Expertise					
Early	135	2.90	1.00	0.74	0.74
Late	137	2.86	0.98		
Administrative Support					
Early	135	2.99	0.84	0.29	0.29
Late	136	2.88	0.84		
Infrastructure					
Early	136	2.74	0.93	0.48	0.48
Late	137	2.66	0.99		

Note: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier

Findings Related to Objective One

The first objective was to describe faculty by selected personal characteristics. These variables include professional area, gender, age, level of education, academic title, teaching experience, and distance education experience.

Professional Area

Table 11 shows distribution of participating CAU faculty by professional area, which is indicated by college. Participants (*N*=273) from twelve different colleges were randomly selected to participate in the study. Among them, 42 (15.4%) were from College of Animal Science and Technology; 41 (15.1%) from College of Resource and Environment; 27 (9.9%) from College of Humanities and Social Science; 27 (9.9%) from College of Agronomy and Biotechnology; 23 (8.5%) from College of Food Science and Nutrition Engineering; 20 (7.4%) from College of Basic Science and Technology; 18 (8.5%) from College of Electronic and Electric Engineering; 17 (6.3%) from College of Water Conservancy and Civil Engineering, 16 (5.9%) from College of Biological Science; 16 (5.9%) from College of Engineering; fourteen (5.1%) from College of Veterinary Medicine; and 11 (4.0%) from College of Economics and Management. One participant chose not to respond to this question.

Table 11
Distribution of Participating CAU Faculty by Professional Area (N=273)

College	*f*	%
Animal Science and Technology	42	15.4
Resource and Environment	41	15.1
Humanities and Social Science	27	9.9
Agronomy and Biotechnology	27	9.9
Food Science and Nutrition Engineering	23	8.5
Basic Science and Technology	20	7.4
Electronic and Electric Engineering	18	6.6
Water Conservancy and Civil Engineering	17	6.3
Biological Science	16	5.9
Engineering	16	5.9
Veterinary Medicine	14	5.1
Economics and Management	11	4.0
Total	272	100

Note: one participant chose not to respond to this question.

Gender

Table 12 indicates distribution of participating CAU faculty (*N*=273) by gender. One hundred and seventy-nine participants (65.6%) were male and 94 participants (34.4%) were female.

Table 12
Distribution of Participating CAU Faculty by Gender (N=273)

Gender	*f*	%
Male	179	65.6
Female	94	34.4
Total	273	100

Age

Table 13 shows dispersal of participating CAU faculty (*N*=273) by age. Twenty-two participants (8.2%) were under 30 years old; 62 (23.1%) were in 30-34 years old range; 67 (25.0%) were in 35-39 years old range; 68 (25.4%) were in 40-44 years old range; 37 (13.8%) were in 45-54 years old range; and 12 (4.5%) were more than 54 years old. The youngest faculty member was 23 years old and the oldest faculty member was 66 years old. The average age of participants was approximately 38 years. Five participants chose not to respond to this question.

Table 13
Distribution of Participating CAU Faculty by Age (N=273)

Age Group	*f*	%
<30	22	8.2
30-34	62	23.1
35-39	67	25.0
40-44	68	25.4
45-54	37	13.8
>54	12	4.5
Total	268	100

Note: *M*=38.44, *SD*=7.54, *Min*=23, *Max*=66; five participants chose not to respond to this question.

Level of Education

Table 14 described participating CAU faculty (*N*=273) by the highest level of education. One hundred and fifty-two participants (57.4%) had a doctoral degree; 69 participants (26%) had a master's degree; and 44 participants (16.6%) had a Bachelor's degree. Eight participants chose not to respond to the question.

Table 14
Distribution of Participating CAU Faculty by Level of Education (N=273)

Degree	*f*	%
Bachelor	44	16.6
Master	69	26
Doctoral	152	57.4
Total	265	100

Notes: eight participants chose not to respond to this question.

Academic Rank

Table 15 shows distribution of participating CAU faculty (*N*=273) by academic rank. One hundred and thirty-eight participants (50.5%) were associate professors; 72 participants (26.4%) were professors; and 63 participants (23.1%) were faculty with other titles.

Table 15
Distribution of Participating CAU Faculty by Academic Rank (N=273)

Rank	*f*	%
Associate Professor	138	50.5
Professor	72	26.4
Faculty with Other Titles	63	23.1
Total	273	100

Teaching Experience

Table 16 shows distribution of participating CAU faculty (*N*=273) by teaching experience. Fifty-nine participants (23.0%) had less than five years' teaching experience. Fifty-eight (22.6%) had between 5-9 years' teaching experience. Forty-nine (19.1%) had between 10-14 years' teaching experience. Forty-one (16.0%) had between 15-19 years' teaching experience. Fifty (19.5%) had more than 19 years' teaching experience. Sixteen participants did not respond to the question.

Table 16
Distribution of Participating CAU Faculty by Teaching Experience (N=273)

Teaching Experience	*f*	%
<5	59	22.9
5-9	58	22.6
10-14	49	19.1
15-19	41	15.9
>19	50	19.5
Total	257	100

Note: sixteen participants chose not to respond to this question.

Distance Education Experience

Table 17 describes distribution of participating CAU faculty (*N*=273) by their distance education experience. Seventy-eight participants (28.7%) had distance education experience and 194 participants (71.3%) had no distance education experience. One participant chose not to respond to this question.

Table 17
Distribution of Participating CAU Faculty by Distance Education Experience (N=273)

Distance Education Experience	*f*	%
Have distance education experience.	78	28.7
Have no distance education experience.	194	71.3
Total	272	100

Note: one participant chose not to respond to this question.

Figure 3 shows the number of adopters of WBDE programs by participating CAU faculty (*N*=273) in recent years. Forty-seven participants had WBDE experience and the length of experiences varied from one to five years. Figure 4 shows rate of adoption of WBDE program among the study population.

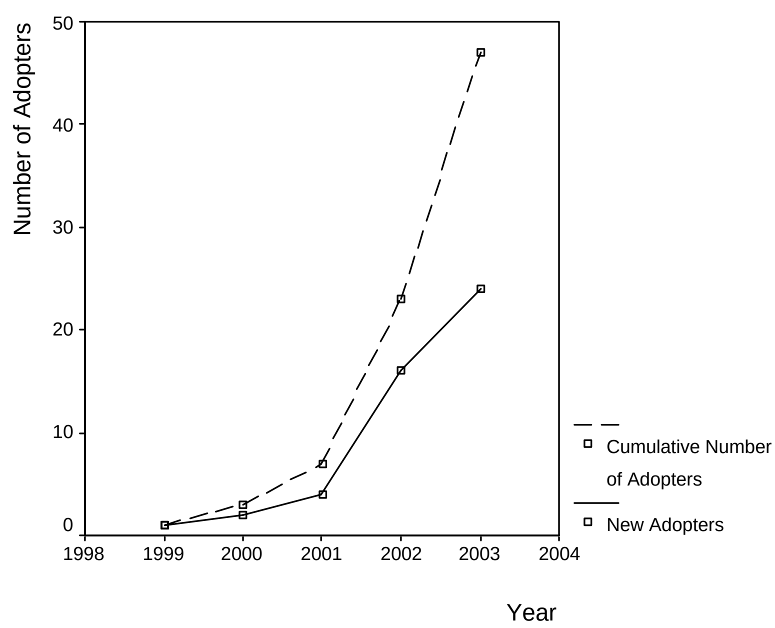

Figure 3. Number of Adopters of WBDE Programs by Participating CAU Faculty (*N*=273)

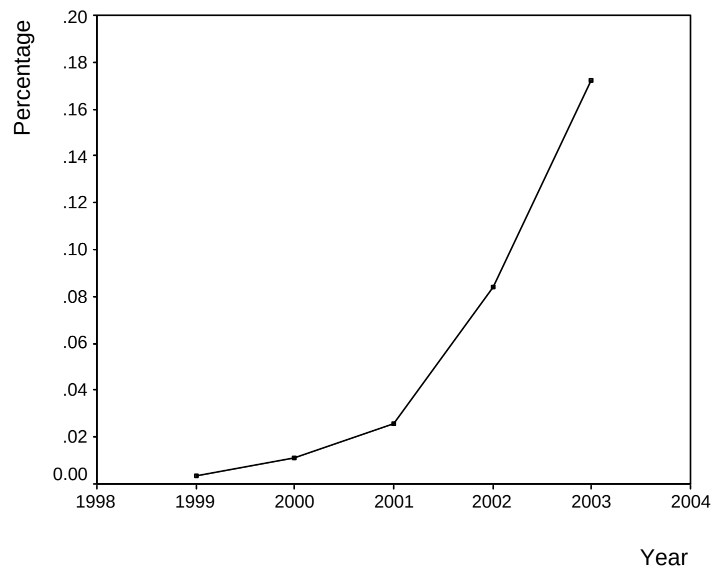

Figure 4. Rate of Adoption of WBDE Programs by Participating CAU Faculty (*N*=273)

Figure 5 shows the number of adopters of TV or broadcasting programs by participating CAU faculty (*N*=273) in the last two decades. Among the 273 participants, 21 participated in TV and Broadcasting programs and the length of experiences varied from one to twenty-three years. Figure 6 indicates rate of adoption of TV or broadcasting programs among the study population.

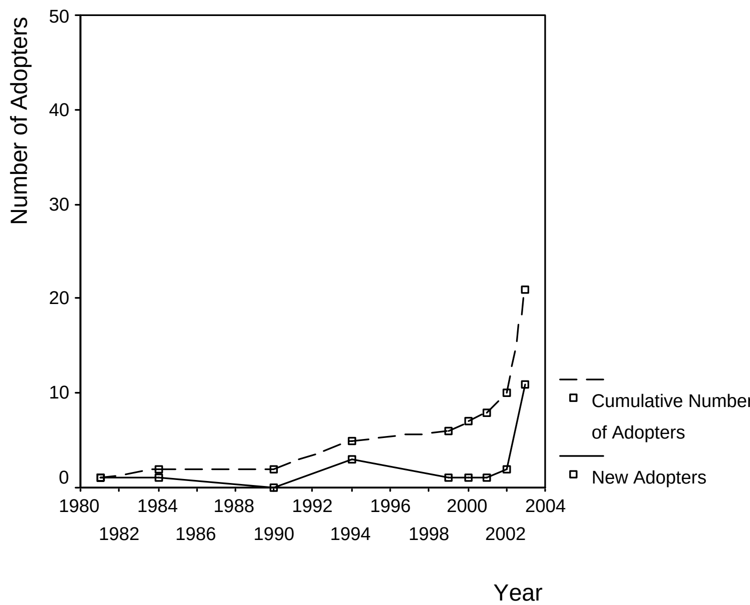

Figure 5. Number of Adopters of TV or Broadcasting Programs by Participating CAU Faculty (*N*=273)

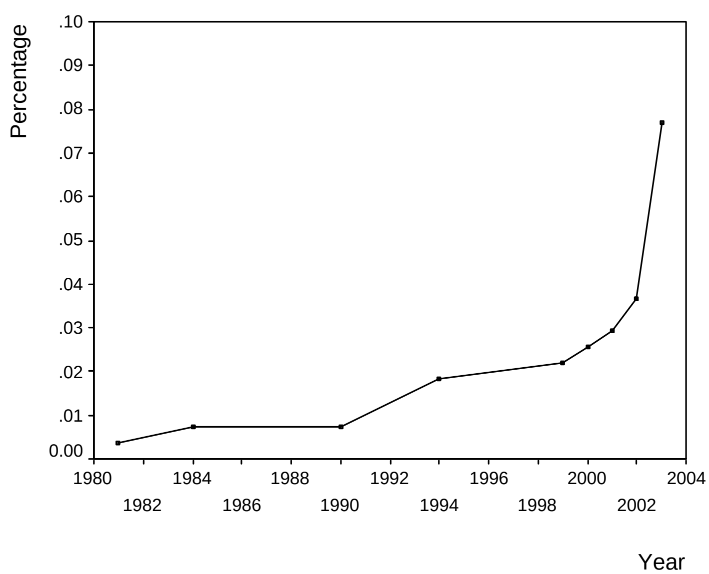

Figure 6. Rate of Adoption of TV or Broadcasting Programs by Participating CAU Faculty (*N*=273)

Figure 7 shows number of adopters of correspondence education programs by participating CAU faculty (*N*=273) in the last two decades. Among the 273 participants, 23 had experiences in correspondence education program and the experience length varied from one to fifteen years. Figure 8 indicates rate of adoption of correspondence education programs among the study population.

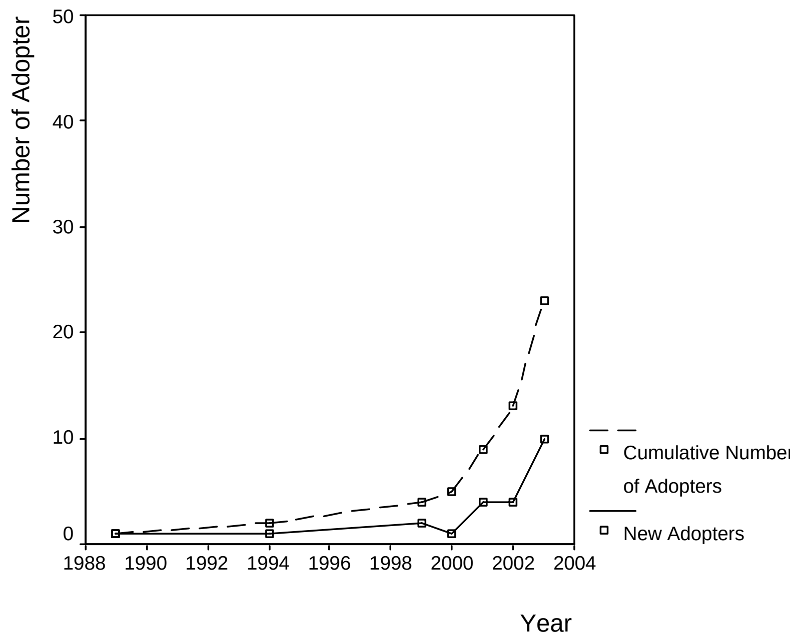

Figure 7. Number of Adopters of Correspondence Education Programs by Participating CAU Faculty (*N*=273)

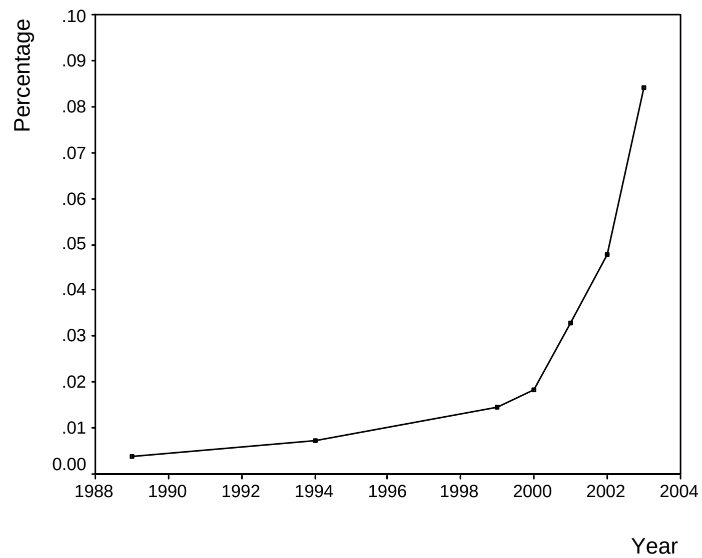

Figure 8. Rate of Adoption of Correspondence Education Programs by Participating CAU Faculty (*N*=273)

Findings Related to Objective Two

The second objective was to describe faculty by their current stage in the innovation-decision process related to WBDE (no knowledge, knowledge, persuasion, decision, implementation, and confirmation).

Table 18 describes participating CAU faculty (*N*=273) by their attitude toward the statement "limited access to higher education by students is a big problem for Chinese institutions of higher education." One hundred and ninety-five (71.9%) agreed with the statement; 48 (17.8%) disagreed with the statement, 28 (10.4%) indicated they were not sure; and three participants chose not to respond to the question.

Table 18
Distribution of Participating CAU Faculty by Their Attitude toward Statement "Limited access to higher education by students is a big problem for Chinese institutions of higher education" (N=273)

Attitude	*f*	%
I agree.	194	71.9
I disagree.	48	17.8
I am not sure.	28	10.4
Total	270	100

Note: three participants chose not to respond to this question; $M = 1.39$, $SD = 0.67$, scale: 1=I agree, 2=I disagree, 3=I am not sure.

A *post hoc* analysis of the data was conducted to describe the relationship between participants' attitude toward the problem of limited access to higher education by students in China and their stage in the innovation-decision process, their perceptions about attributes of WBDE, their perceptions of barriers to diffusion of WBDE, and their personal characteristics. Findings showed that participants' attitude toward the problem did not differ by stage in the innovation-decision process, $F\ (2, 264)=2.37$, $p>0.05$. Findings also showed no differences toward the problem by the following perceptions of attributes, barriers, and personal characteristics: relative advantage, $F\ (2, 267)=0.76$, $p>0.05$; compatibility, $F\ (2, 267)=0.02$, $p>0.05$; complexity, $F\ (2, 267)=1.62$, $p>0.05$; trialability, $F\ (2, 265)=1.41$, $p>0.05$; observability, $F\ (2, 267)=2.00$, $p>0.05$; concerns about time, $F\ (2, 265)=2.64$, $p>0.05$; concerns about incentives, $F\ (2, 265)=0.93$, $p>0.05$; WBDE program credibility, $F\ (2, 266)=0.15$, $p>0.05$; financial concerns, $F\ (2, 259)=1.22$, $p>0.05$; planning issues, $F\ (2, 265)=0.65$, $p>0.05$; conflict with traditional education, $F\ (2, 267)=2.92$, $p>0.05$; technical expertise, $F\ (2, 266)=0.60$,

$p>0.05$; administrative support, $F(2, 265)=0.63$, $p>0.05$; infrastructure, F $(2, 267)=1.60$, $p>0.05$; professional area, F $(11, 257)=0.82$, $p>0.05$; gender, t $(268)=1.46$, $p>0.05$; age, F $(5, 259)=2.31$, $p>0.05$; level of education, F $(2, 259)=0.23$, $p>0.05$; academic rank, F $(2,267)=2.38$, $p>0.05$; and teaching experience, F $(4, 249)=1.91$, $p>0.05$.

Findings showed that participants' attitudes toward the problem differed significantly by perceptions about fear of technology as a barrier to WBDE, F $(2, 267)=8.42$, $p<0.05$; and by distance education experience, t $(267)=2.60$, $p>0.05$. Faculty who agreed with the problem perceived fear of technology as a moderate barrier, while faculty who disagreed with the problem perceived fear of technology as a weak barrier. Faculty with distance education experience tended to agree with the existence of the problem, while faculty without distance education experience tended to disagree with the problem.

Stage in the Innovation-Decision Process

Table 19 shows the distributions of participants according to their different stages in the innovation-decision process related to WBDE. Six stages were used in the study to describe the innovation-decision process: no knowledge, knowledge, persuasion, decision, implementation, and confirmation. Among the 273 participants, 14.2% showed "no knowledge" about WBDE. More than half of the population were in the stages of either "knowledge" (30.2%) or "persuasion" (26.5%). The rest of the population were in the stages of "decision" (14.6%), "implementation" (6.3%) or "confirmation" (8.2%). Six participants chose not to respond to this question. Figure 9 also describes the distribution of the population in the six stages of the innovation-decision process related to WBDE (no knowledge, knowledge, persuasion, decision, implementation, and confirmation).

Table 19
Distribution of Participating CAU Faculty by Their Current Stage in the Innovation-Decision Process (N=273)

Stage	Descriptions	*f*	%
No knowledge	I have not used Web-based distance education programs and have no plans for doing it.	38	14.2
Knowledge	Web-based distance education may be a way to reach more students in Chinese higher education.	81	30.2
Persuasion	Web-based distance education is a way to reach more students in Chinese higher education.	71	26.5
Decision	I know the benefits of Web-based distance education. In the near future, I will try it in my own teaching.	39	14.6
Implementation	I am currently using Web-based distance education and it helps me reach students that otherwise do not have access to higher education programs.	17	6.3
Confirmation	I have used Web-based distance education for more than one semester and plan on continuing to do so.	22	8.2
Total		268	100

Note: six participants chose not to respond to this question; *M*=2.93, *SD*=1.42, scale: 1=No Knowledge, 2=Knowledge, 3=Persuasion, 4=Decision, 5=Implementation, 6=Confirmation.

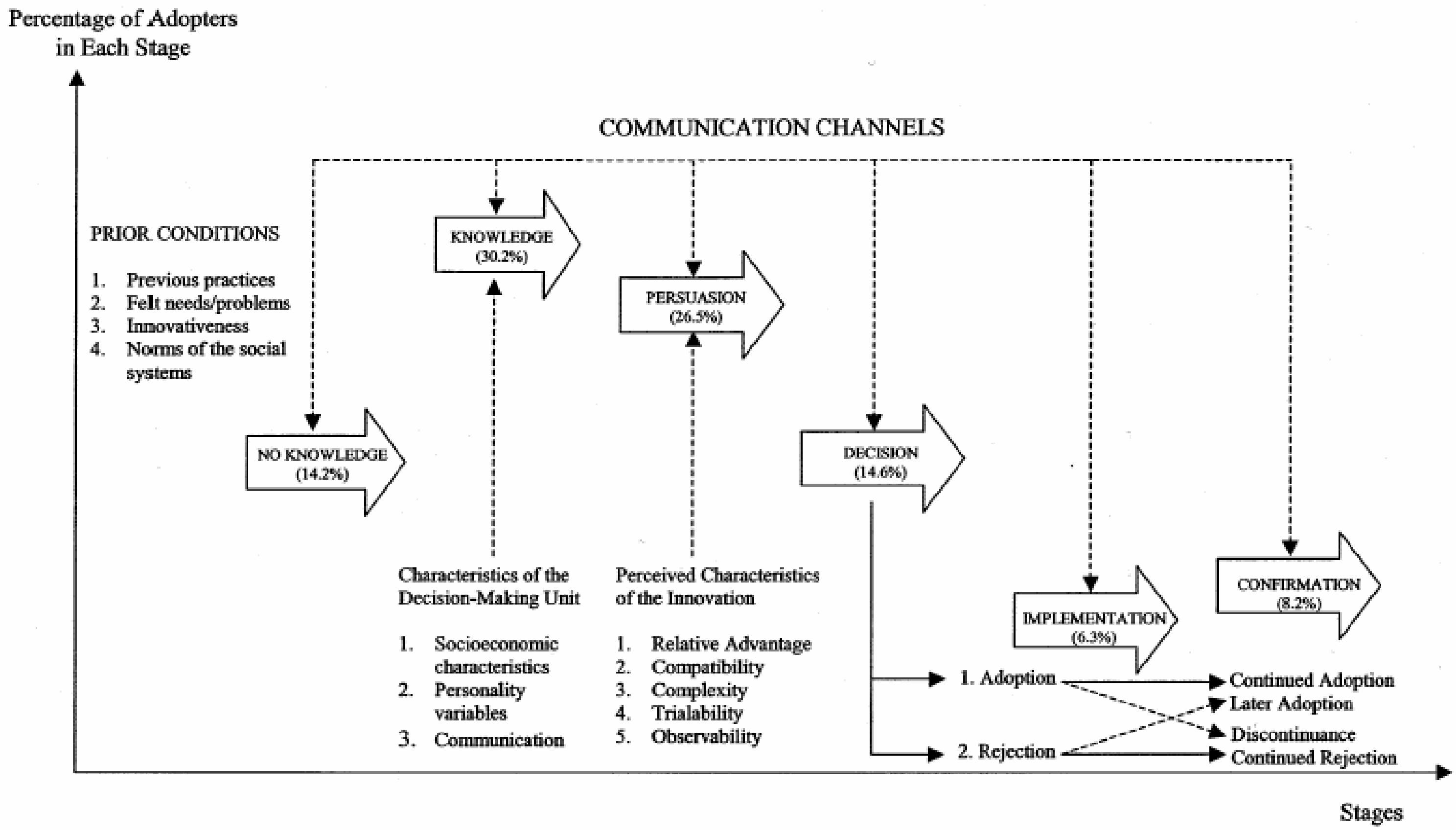

Figure 9. Distribution of Population in the Six Stages of the Innovation-Decision Process (N=273)

Note: the figure was based on Rogers' (2003) model of five stages in the innovation-decision process.

Findings Related to Objective Three

The third objective was to describe faculty according to their perceptions about attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability).

Perceived Relative Advantage of WBDE

The perceived relative advantage of WBDE was measured by participants' responses to four statements. Frequencies and percentages were used to describe the results. As shown in Table 20, approximately 84% of participants agreed or strongly agreed that a more flexible time schedule could be followed by using WBDE. Over 70% of participants agreed or strongly agreed that using WBDE could give access to more teaching resources. About 60% of participants agreed or strongly agreed that WBDE could be provided economically and about 32% of participants chose a neutral attitude toward this statement. About 62% of participants agreed or strongly agreed that using WBDE could reach more students. Overall, the mean and standard deviation for perceived relative advantage of WBDE were *M*=3.84 and *SD*=0.63. Faculty at the China Agricultural University tended to agree with the existence of relative advantage of WBDE.

Table 20
Distribution of Participating CAU Faculty by Their Perceptions about Relative Advantage of WBDE (N=273)

		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
A more flexible time schedule could be followed by using Web-based distance education.	273	4	1.5	13	4.8	27	9.9	141	51.6	88	32.2
Using Web-based distance education could give me access to more teaching resources.	273	3	1.1	12	4.4	59	21.6	118	43.2	81	29.7
Web-based distance education could be provided economically.	273	4	1.5	20	7.3	86	31.5	106	38.8	57	20.9
Using Web-based distance education could reach more students.	273	8	2.9	38	13.9	58	21.2	117	42.9	52	19.0

Note: Overall *M*=3.84, *SD*=0.63; scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Perceived Compatibility of WBDE

The perceived compatibility of WBDE was measured by participants' responses to four statements. Frequencies and percentages are used to describe the results. As Table 21 shows, 231 (84.6%) agreed or strongly agreed that WBDE technologies were available to me. Approximately 85% of participants agreed or strongly agreed that using WBDE technologies were acceptable to them. Seventy-eight percent of participants agreed or strongly agreed that procedures used in WBDE would fit well with their teaching conditions. About 61% of participants agreed or strongly agreed that WBDE technologies were available to students and about 29% of participants kept a neutral attitude toward the statement. Overall, the mean and standard deviation for perceived compatibility of WBDE were *M*=3.91 and *SD*=0.57. Faculty at the China Agricultural University tended to agree with the existence of compatibility of WBDE.

Table 21
Distribution of Participating CAU Faculty by Their Perceptions about Compatibility of WBDE (N=273)

		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Web-based distance education technologies are available to me.	273	2	0.7	8	2.9	32	11.7	159	58.2	72	26.4
Using Web-based distance education technologies are acceptable to me.	273	2	0.7	9	3.3	26	9.5	166	60.8	70	25.6
Procedures used in Web-based distance education would fit well with my teaching conditions.	273	2	0.7	14	5.1	44	16.1	172	63.0	41	15.0
Web-based distance education technologies are available to students.	273	2	0.7	26	9.5	78	28.6	134	49.1	33	12.1

Note: Overall *M*=3.91; *SD*=0.57; scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Perceived Complexity of WBDE

The perceived complexity of WBDE was measured by participants' responses to four statements. Frequencies and percentages are used to describe the results. As Table 22 shows, about 85% of participants agreed or strongly agreed that WBDE technologies were readily available to faculty. About 72% of participants agreed or strongly agreed that WBDE technologies were easy to use. About 75% of participants agreed or strongly agreed that the changes in teaching methodology necessary to use WBDE were easy to understand. Approximately 60% of participants agreed or strongly agreed that the changes in teaching methodology necessary to use WBDE would be easy for them to implement and about 28% of participants kept a neutral attitude toward the statement. Overall, the mean and standard deviation for perceived complexity of WBDE were M=3.77 and SD=0.62. Faculty at the China Agricultural University tended to agree with the existence of complexity of WBDE.

Table 22
Distribution of Participating CAU Faculty by Their Perceptions about Complexity of WBDE (N=273)

		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Web-based distance education technologies are readily available to faculty.	273	3	1.1	12	4.4	54	19.8	148	54.2	56	20.5
Web-based distance education technologies are easy to use.	273	2	0.7	12	4.4	59	21.6	153	56.0	47	17.2
The changes in teaching methodology necessary to use Web-based distance education are easy to understand.	273	4	1.5	15	5.5	51	18.7	161	59.0	42	15.4
The changes in teaching methodology necessary to use Web-based distance education will be easy for me to implement.	273	6	2.2	28	10.3	77	28.2	135	49.5	27	9.9

Note: Overall *M*=3.77; *SD*=0.62; scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Perceived Trialability of WBDE

The perceived trialability of WBDE was measured by participants' response to four statements. Frequencies and percentages are used to describe the results. As Table 23 shows, about 89% of participants agreed or strongly agreed that it was possible for them currently to accomplish some teaching functions (e.g., reporting grades, communication with students) on the Web. Eighty-five percent of participants agreed or strongly agreed that it was possible for them currently to put selected teaching materials (e.g., readings, assignments) on the Web in support of their classes. About 77% of participants agreed or strongly agreed that it was possible for students to use WBDE tools (e.g., Accessing Internet, downloading and uploading materials, watching video lessons, chat on-line, etc.). Seventy-four percent of participants agreed or strongly agreed that it was possible for them to deliver selected portions of a course (a single lesson or unit) by using WBDE prior to developing an entire course. Overall, the mean and standard deviation for perceived trialability of WBDE were M=4.02 and SD=0.60. Faculty at the China Agricultural University tended to agree with the existence of trialability of WBDE.

Table 23
Distribution of Participating CAU Faculty by Their Perceptions about Trialability of WBDE (N=273)

		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
It is possible for me currently to accomplish some teaching functions (e.g., reporting grades, communication with students) on the Web.	271	2	0.7	6	2.2	21	7.7	152	56.1	90	33.2
It is possible for me currently to put selected teaching materials (e.g., readings, assignments) on the Web in support of my classes.	271	4	1.5	8	3.0	28	10.3	153	56.5	78	28.8
It is possible for students to use web-based distance education tools (e.g., Accessing Internet, downloading and uploading materials, watching video lessons, chat on-line, etc.).	271	1	0.4	10	3.7	52	19.2	143	52.8	65	24.0
It is possible for me to deliver selected portions of a course (a single lesson or unit) by using Web-based distance education prior to developing an entire course.	271	3	1.1	19	7.0	46	17.0	156	57.6	47	17.3

Note: two participants chose not to respond to this question; Overall *M*=4.02; *SD*=0.60; scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree.

Perceived Observability of WBDE

The perceived observability of WBDE was measured by participants' responses to four statements. Frequencies and percentages are used to describe the results. As Table 24 shows, about 86% of participants agreed or strongly agreed that they knew of some faculty members who are using WBDE. About 80% of participants agreed or strongly agreed that they have observed some WBDE courses on their campus. About 80% of participants agreed or strongly agreed that they were aware of the benefits of WBDE for students. About 76% of participants agreed or strongly agreed that they were aware of the limitations of WBDE for students. Overall, the mean and standard deviation for perceived observability of WBDE were *M*=4.01 and *SD*=0.54. Faculty at the China Agricultural University tended to agree with the existence of observability of WBDE.

Findings Related to Objective Four

The fourth objective was to describe faculty according to their perceptions about barriers to diffusion of WBDE (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure).

Table 24
Distribution of Participating CAU Faculty by Their Perceptions about Observability of WBDE (N=273)

		Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
I know of some faculty members who are using Web-based distance education.	273	0	0	7	2.6	30	11.0	163	59.7	73	26.7
I have observed some Web-based distance education courses on my campus.	273	0	0	7	2.6	48	17.6	152	55.7	66	24.2
I am aware of the benefits of Web-based distance education programs for students.	273	1	0.4	8	2.9	47	17.2	157	57.5	60	22.0
I am aware of the limitations of Web-based distance education programs for students.	273	0	0	8	2.9	58	21.2	155	56.8	52	19.0

Note: Overall *M*=4.01; *SD*=0.54; scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Concerns about Time as a Perceived Barrier to Diffusion of WBDE

Participants' perceptions about concerns about time as a barrier to diffusion of WBDE were measured by four statements. Table 25 shows the results, which are described by frequencies and percentages. As to "increased faculty time for on-line communication with students," about 56% of participants thought it was a moderate or strong barrier. As to "increased faculty time commitment for course development," almost half of participants (48.4%) thought it is a moderate or strong barrier and about 38% of participants thought it was no or a weak barrier. As to "increased faculty time for getting feedback from students," almost half of participants (48.7%) thought it was a moderate or strong barrier and about 43% of participants thought it was no or a weak barrier. As to "increased faculty time to explore more information," half of participants (50.5%) thought it was not or a weak barrier. Overall, the mean and standard deviation for concerns about time as a perceived barrier to diffusion of WBDE were M=2.84 and SD=1.04. Faculty at the China Agricultural University tended to perceive concerns about time as a moderate barrier to diffusion of WBDE.

Table 25
Distribution of Participating CAU Faculty by Their Perceptions about Concerns about Time as a Barrier to Diffusion of WBDE (N=273)

		No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
Statement	*N*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Increased faculty time for on-line communication with students.	271	37	13.7	51	18.8	76	28.0	75	27.7	32	11.8
Increased faculty time commitment for course development.	271	53	19.6	51	18.8	72	26.6	59	21.8	36	13.3
Increased faculty time for getting feedback from students.	271	58	21.4	58	21.4	69	25.5	63	23.2	23	8.5
Increased faculty time to explore more information.	271	73	26.9	64	23.6	48	17.7	49	18.1	37	13.7

Note: two participants chose not to respond to this question; Overall *M*=2.84; *SD*=1.04; scale: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier.

Concerns about Incentives as a Perceived Barrier to Diffusion of WBDE

Participants' perceptions about concerns about incentives as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Table 26 shows the results, which are described by frequencies and percentages. As to "monetary compensation for adopting Web-based distance education," more than half of participants (51.3%) thought it was a moderate or strong barrier. As to "incentives for adopting Web-based distance education," about 52% of participants thought it was a moderate or strong barrier and about 40% of participants thought it was no or weak barrier. As to "awards for adopting Web-based distance education," almost half of participants (49.1%) think it is a moderate or strong barrier and about 42% of participants thought it was no or weak barrier. As to "recognition for adopting Web-based distance education," 52% of participants thought it was a moderate or strong barrier and about 41% of participants thought it was no or a weak barrier. Overall, the mean and standard deviation for concerns about incentives as a perceived barrier to diffusion of WBDE were M=2.75 and SD=0.94. Faculty at the China Agricultural University tended to perceive concerns about incentives as a moderate barrier to diffusion of WBDE.

Table 26
Distribution of Participating CAU Faculty by Their Perceptions about Concerns about Incentives as a Barrier to Diffusion of WBDE (N=273)

		No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
Statement	*N*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Monetary compensation for adopting Web-based distance education.	271	46	17.0	53	19.6	89	32.8	50	18.5	33	12.2
Incentives for adopting Web-based distance education.	271	45	16.7	64	23.7	96	35.6	45	16.7	20	7.4
Awards for adopting Web-based distance education.	271	63	23.2	52	19.2	81	29.9	52	19.2	23	8.5
Recognition for adopting Web-based distance education.	271	60	22.1	52	19.2	92	33.9	49	18.1	18	6.6

Note: two participants chose not to respond to this question; Overall M=2.75; SD=0.94; scale: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier.

WBDE Program Credibility as a Perceived Barrier to Diffusion of WBDE

Participants' perceptions about WBDE program credibility as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Table 27 shows the results, which are described by frequencies and percentages. As to "concerns about evaluation of students' work," about 56% of participants thought it was a moderate or strong barrier. As to "concerns about testing of students' work," about 58% of participants thought it was a moderate or strong barrier. As to "concern that Web-based distance education programs lower the quality of students who are admitted," half of participants (50.1%) thought it was a moderate or strong barrier. As to "concern that Web-based distance education programs lower the expectations for student learning," almost half of participants (48.7%) thought it was a moderate or strong barrier and about 37% of participants thought it was no or a weak barrier. Overall, the mean and standard deviation for WBDE program credibility as a perceived barrier to diffusion of WBDE were M=3.14 and SD=1.02. Faculty at the China Agricultural University tended to perceive WBDE program credibility as a moderate barrier to diffusion of WBDE.

Table 27
Distribution of Participating CAU Faculty by Their Perceptions about WBDE Program Credibility as a Barrier to Diffusion of WBDE (N=273)

		No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Concerns about evaluation of students' work.	271	27	10.0	41	15.1	72	26.6	79	29.2	52	19.2
Concerns about testing of students' work.	271	31	11.4	42	15.5	77	28.4	80	29.5	41	15.1
Concern that Web-based distance education programs lower the quality of students who are admitted.	271	43	15.9	49	18.1	73	26.9	63	23.2	43	15.9
Concern that Web-based distance education programs lower the expectations for student learning.	271	42	15.5	57	21.0	75	27.7	57	21.0	40	14.8

Note: two participants chose not to respond to this question; Overall *M*=3.14; *SD*=1.02; scale: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier.

Financial Concerns as a Perceived Barrier to Diffusion of WBDE

Participants' perceptions about financial concerns as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Table 28 shows the results, which are described by frequencies and percentages. As to "lack of money to implement Web-based distance education programs," about 56% of participants thought it was a moderate or strong barrier and about 21% of participants thought it was a very strong barrier. As to "increased payment for cost of technologies," about 57% of participants thought it was a weak or moderate barrier and 20% of participants thought it was a strong barrier. As to "sharing revenue with department or business units," about 59% of participants thought it was a weak or moderate barrier. As to "increased tuition and fee rates," about 57% of participants thought it was a weak or moderate barrier and about a quarter of participants (26.4%) thought it was no barrier. Overall, the mean and standard deviation for financial concerns as a perceived barrier to diffusion of WBDE were *M*=2.87 and *SD*=0.88. Faculty at the China Agricultural University tended to perceive financial concerns as a moderate barrier to diffusion of WBDE.

Table 28
Distribution of Participating CAU Faculty by Their Perceptions about Financial Concerns as a Barrier to Diffusion of WBDE (N=273)

		No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Lack of money to implement Web-based distance education programs.	265	19	7.2	44	16.6	77	29.1	70	26.4	55	20.8
Increased payment for cost of technologies.	265	31	11.7	63	23.8	89	33.6	53	20.0	29	10.9
Sharing revenue with department or business units.	265	46	17.4	56	21.1	99	37.4	47	17.7	17	6.4
Increased tuition and fee rates.	265	70	26.4	73	27.5	78	29.4	27	10.2	17	6.4

Note: eight participants chose not to respond to this question; Overall *M*=2.87; *SD*=0.88; scale: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier

Planning Issues as a Perceived Barrier to Diffusion of WBDE

Participants' perceptions about planning issues as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Table 29 shows the results, which are described by frequencies and percentages. As to "lack of strategic planning for Web-based distance education," about 60% of participants thought it was a moderate or strong barrier. As to "lack of a champion for Web-based distance education in the departments within the university," 60% of participants thought it was a moderate or strong barrier. As to "lack of shared vision for the role of Web-based distance education in the organization," about 54% of participants thought it was a moderate or strong barrier. As to "lack of identified need (perceived or real) for Web-based distance education," about 55% of participants thought it was a weak or moderate barrier and about a quarter of participants thought it was no barrier. Overall, the mean and standard deviation for planning issues as a perceived barrier to diffusion of WBDE were M=2.90 and SD=0.95. Faculty at the China Agricultural University tended to perceive planning issues as a moderate barrier to diffusion of WBDE.

Table 29
Distribution of Participating CAU Faculty by Their Perceptions about Planning Issues as a Barrier to Diffusion of WBDE (N=273)

		No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Lack of strategic planning for Web-based distance education.	271	25	9.2	41	15.1	82	30.3	80	29.5	43	15.9
Lack of a champion for Web-based distance education in the departments within the university.	271	37	13.7	40	14.8	101	37.3	61	22.5	32	11.8
Lack of shared vision for the role of Web-based distance education in the organization.	271	52	19.2	52	19.2	86	31.7	59	21.8	22	8.1
Lack of identified need (perceived or real) for Web-based distance education.	271	71	26.2	67	24.7	81	29.9	38	14.0	14	5.2

Note: two participants chose not to respond to this question; Overall *M*=2.90; *SD*=0.95; Scale: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier.

Fear of Technology as a Perceived Barrier to Diffusion of WBDE

Participants' perceptions about fear of technology as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Table 30 shows the results, which are described by frequencies and percentages. As to "increased isolation of instructors," about 46% of participants thought it was a strong or very strong barrier and 41% of participants thought it was a weak or moderate barrier. As to "concern for legal issues (e.g., computer crime, hackers, software piracy, copyright)," about 50% of participants thought it was a weak or moderate barrier. As to “threat to instructors’ sense of competence and authority,” about 69% of participants thought it was no or a weak barrier. As to “belief that job security is threatened,” about 69% of participants thought it was no or a weak barrier. Overall, the mean and standard deviation for fear of technology as a perceived barrier to diffusion of WBDE were *M*=2.57 and *SD*=0.93. Faculty at the China Agricultural University tended to perceive fear of technology as a moderate barrier to diffusion of WBDE.

Table 30
Distribution of Participating CAU Faculty by Their Perceptions about Fear of Technology as a Barrier to Diffusion of WBDE (N=273)

		No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Increased isolation of instructors.	273	37	13.6	52	19.0	59	21.6	67	24.5	58	21.2
Concern for legal issues (e.g., computer crime, hackers, software piracy, copyright).	273	41	15.0	55	20.1	83	30.4	51	18.7	43	15.8
Threat to instructors’ sense of competence and authority.	273	121	44.3	66	24.2	50	18.3	24	8.8	12	4.4
Belief that job security is threatened.	273	122	44.7	67	24.5	50	18.3	25	9.2	9	3.3

Note: Overall *M*=2.57; *SD*=0.93; scale: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong

Conflict with Traditional Education as a Perceived Barrier to Diffusion of WBDE

Participants' perceptions about conflict with traditional education as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Table 31 shows the results, which are described by frequencies and percentages. As to "lack of person-to-person contact (i.e., lack of face-to-face interaction with students; difficulty building rapport with participants at a distance)," about 53% of participants thought it was a strong or very strong barrier. As to "disruption of the classroom's traditional social organization," about 58% of participants thought it was no or a weak barrier. As to "traditional academic calendar/schedule hinders Web-based distance education," about 56% of participants thought it was no or a weak barrier. As to "competition with on-campus offerings or competition for existing students," about 64% of participants thought it was no or a weak barrier. Overall, the mean and standard deviation for conflict with traditional education as a perceived barrier to diffusion of WBDE were M=2.58 and SD=0.91. Faculty at the China Agricultural University tended to perceive conflict with traditional education as a moderate barrier to diffusion of WBDE.

Table 31
Distribution of Participating CAU Faculty by Their Perceptions about Conflict with Traditional Education as a Barrier to Diffusion of WBDE (N=273)

		No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Lack of person-to-person contact (i.e., lack of face-to-face interaction with students; difficulty building rapport with participants at a distance).	273	29	10.6	30	11.0	69	25.3	61	22.3	84	30.8
Disruption of the classroom's traditional social organization.	273	92	33.7	67	24.5	60	22.0	38	13.9	16	5.9
Traditional academic calendar/schedule hinders Web-based distance education.	273	90	33.0	63	23.1	76	27.8	35	12.8	9	3.3
Competition with on-campus offerings or competition for existing students.	273	100	36.6	74	27.1	63	23.1	24	8.8	12	4.4

Note: Overall *M*=2.58; *SD*=0.91; scale: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier.

Technical Expertise as a Perceived Barrier to Diffusion of WBDE

Participants' perceptions about technical expertise as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Table 32 shows the results, which are described by frequencies and percentages. As to "lack of training programs for Web-based distance education," about 61% of participants thought it was a moderate or strong barrier. As to "lack of the 'right' people to implement web-based distance education," about 55% of participants thought it was a moderate or strong barrier. As to "lack of knowledge about Web-based distance education," about 59% of participants thought it was a weak or moderate barrier. As to "lack of technical support," almost half of participants (48.5%) thought it was a weak or moderate barrier and less than one quarter of participants (22.1%) thought it was no barrier. Overall, the mean and standard deviation for technical expertise as a perceived barrier to diffusion of WBDE were *M*=2.88 and *SD*=0.99. Faculty at the China Agricultural University tended to perceive technical expertise as a moderate barrier to diffusion of WBDE.

Table 32
Distribution of Participating CAU Faculty by Their Perceptions about Technical Expertise as a Barrier to Diffusion of WBDE (N=273)

		No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Lack of training programs for Web-based distance education.	272	29	10.7	48	17.6	102	37.5	63	23.2	30	11.0
Lack of the "right" people to implement web-based distance education.	272	40	14.7	52	19.1	84	30.9	65	23.9	31	11.4
Lack of knowledge about Web-based distance Education.	272	43	15.8	75	27.6	84	30.9	51	18.8	19	7.0
Lack of technical support.	272	60	22.1	64	23.5	68	25.0	51	18.8	29	10.7

Note: one participant chose not to respond to this question; Overall *M*=2.88; *SD*=0.99, scale: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier.

Administrative Support as a Perceived Barrier to Diffusion of WBDE

Participants' perceptions about administrative support as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Table 33 shows the results, which are described by frequencies and percentages. As to "copyright/fair use issues in using materials in Web-based distance education," 55% of participants thought it was a moderate or strong barrier and about one quarter of participants (26.9%) thought it was a very strong barrier. As to "lack of support or encouragement from administrators," about 56% of participants thought it was a moderate or strong barrier. As to "difficulty in recruiting faculty," about 61% of participants thought it was a weak or moderate barrier. As to "difficulty in recruiting students," about 60% of participants thought it was a weak or moderate barrier and about 20% of participants thought it was no barrier. Overall, the mean and standard deviation for administrative support as a perceived barrier to diffusion of WBDE were M=2.94 and SD=0.84. Faculty at the China Agricultural University tended to perceive administrative support as a moderate barrier to diffusion of WBDE.

Table 33
Distribution of Participating CAU Faculty by Their Perceptions about Administrative Support as a Barrier to Diffusion of WBDE (N=273)

		No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
Statement	*N*	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Copyright/fair use issues in using materials in Web-based distance education.	271	15	5.5	34	12.5	80	29.5	69	25.5	73	26.9
Lack of support or encouragement from Administrators.	271	35	12.9	53	19.6	93	34.3	60	22.1	30	11.1
Difficulty in recruiting faculty.	271	51	18.8	78	28.8	86	31.7	39	14.4	17	6.3
Difficulty in recruiting students.	271	54	19.9	79	29.2	83	30.6	33	12.2	22	8.1

Note: two participants chose not to respond to this question; Overall *M*=2.94, *SD*=0.84, scale: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier.

Infrastructure as a Perceived Barrier to Diffusion of WBDE

Participants' perceptions about infrastructure as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Table 34 shows the results, which are described by frequencies and percentages. As to "lack of adequate student access to computer and Internet," about 50% of participants thought it was a moderate or strong barrier and about 21% of participants thought it was a weak barrier. As to "lack of adequate technology-enhanced classrooms/labs/infrastructure," about 53% of participants thought it was a moderate or strong barrier. As to "lack of library access or delivery of materials and services," about half of participants (48.7%) thought it was a weak or moderate barrier and about 20% of participants thought it was no barrier. As to "lack of adequate instructor access to computer and Internet," 70% of participants thought it was no or a weak barrier. Overall, the mean and standard deviation for infrastructure as a perceived barrier to diffusion of WBDE were M=2.70 and SD=0.96. Faculty at the China Agricultural University tended to perceive infrastructure as a moderate barrier to diffusion of WBDE.

Table 34
Distribution of Participating CAU Faculty by Their Perceptions about Infrastructure as a Barrier to Diffusion of WBDE (N=273)

		No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
Statement	*N*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Lack of adequate student access to computer and Internet.	273	39	14.3	56	20.5	76	27.8	58	21.2	44	16.1
Lack of adequate technology-enhanced classrooms/labs/infrastructure.	273	44	16.1	49	17.9	90	33.0	55	20.1	35	12.8
Lack of library access or delivery of materials and services.	273	54	19.8	71	26.0	62	22.7	46	16.8	40	14.7
Lack of adequate instructor access to computer and Internet.	273	130	47.6	62	22.7	42	15.4	27	9.9	12	4.4

Note: Overall M=2.70, SD=0.96, scale: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier

Table 35 summarizes the means and standard deviations of the ten perceived barriers to WBDE. Barriers that have higher mean values were: WBDE program credibility (M=3.14, SD=1.02), administrative support (M=2.94, SD=0.84), planning issues (*M*=2.90, *SD*=0.95), technical expertise (*M*=2.88, *SD*=0.99), financial concerns (*M*=2.87, *SD*=0.88), and concerns about time (*M*=2.84, *SD*=1.04). Barriers that have lower mean values include: concerns about incentives (*M*=2.75, *SD*=0.94), infrastructure (*M*=2.70, *SD*=0.96), conflict with traditional education (*M*=2.58, *SD*=0.91), and fear of technology (*M*=2.57, *SD*=0.93). Faculty at the China Agricultural University perceived all of the ten items as moderate barriers to diffusion of WBDE.

Table 35
Means and Standard Deviations of the Ten Perceived Barriers

Perceived Barriers to WBDE	*M*	*SD*	*Scale*
WBDE Program Credibility	3.14	1.02	Moderate
Administrative Support	2.94	0.84	Moderate
Planning Issues	2.90	0.95	Moderate
Technical Expertise	2.88	0.99	Moderate
Financial Concerns	2.87	0.88	Moderate
Concerns about Time	2.84	1.04	Moderate
Concerns about Incentives	2.75	0.94	Moderate
Infrastructure	2.70	0.96	Moderate
Conflict with Traditional Education	2.58	0.91	Moderate
Fear of Technology	2.57	0.93	Moderate

Note: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier

Findings Related to Objective Five

The fifth objective was to examine the relationship between faculty members' selected personal characteristics and their stage in the innovation-decision process.

Stage in the Innovation-Decision Process by Professional Area

Table 36 shows participants' stage in the innovation-decision process by professional area. Faculty members' stage in the innovation-decision process differed significantly by professional area, F (11, 255)=2.63, p<0.05. A medium effect size (f=0. 34) was found. Overall, China Agricultural University faculty (M=2.93, SD=1.42) tended to be in the stage of "persuasion." Faculty from the College of Humanities and Social Science (M=3.88, SD=1.54) tended to be in the stage of "decision," while faculty from the College of Electronic and Electric Engineering (M=3.47, SD=1.59), College of Food Science and Nutrition Engineering (M=3.09, SD=1.31), College of Engineering (M=3.06, SD= 1.69), College of Economics and Management (M=3.00, SD=1.63), College of Veterinary Medicine (M=3.00, SD=1.36), College of Agronomy and Biotechnology (M=3.00, SD=1.44), College of Animal Science and Technology (M=2.88, SD=1.29), College of Basic Science and Technology (M=2.70, SD=1.08), and College of Resource and Environment (M=2.68, SD=1.47) tended to be in the "persuasion" stage. Faculty from the College of Water Conservancy and Civil Engineering (M=2.24, SD=0.90) and the College of Biological Science (M=2.00, SD=0.82) tended to be in the "knowledge" stage.

Table 36
Distribution of Participating CAU Faculty Members' Stage in the Innovation-Decision Process by Professional Area (N=273)

Stage in the Innovation-decision Process	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	25	3.88	1.54	2.63*	0.00
Electronic and Electric Engineering	17	3.47	1.59		
Food Science and Nutrition Engineering	23	3.09	1.31		
Engineering	16	3.06	1.69		
Economics and Management	10	3.00	1.63		
Agronomy and Biotechnology	26	3.00	1.44		
Veterinary Medicine	14	3.00	1.36		
Animal Science and Technology	42	2.88	1.29		
Basic Science and Technology	20	2.70	1.08		
Resource and Environment	41	2.68	1.47		
Water Conservancy and Civil Engineering	17	2.24	0.90		
Biological Science	16	2.00	0.82		

Note: 1=No Knowledge, 2=Knowledge, 3=Persuasion, 4=Decision, 5=Implementation, 6=Confirmation

Stage in the Innovation-Decision Process by Gender

Table 37 shows participants' stage in the innovation-decision process by gender. Faculty members' stage in the innovation-decision process did not differ by gender, $t(266)=0.97$, $p>0.05$. A small effect size ($d=0.11$) was found.

Table 37
Distribution of Participating CAU Faculty Members' Stage in the Innovation-Decision Process by Gender (N=273)

Stage in the Innovation-Decision Process	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	175	2.99	1.41	0.97	0.33
Female	93	2.82	1.44		

Note: 1=No Knowledge, 2=Knowledge, 3=Persuasion, 4=Decision, 5=Implementation, 6=Confirmation

Stage in the Innovation-Decision Process by Age

Table 38 shows participants' stage in the innovation-decision process by age. Faculty members' stage in the innovation-decision process did not differ by age, *F* (5, 257)=1.73, *p*>0.05. A small effect size (*f*=0.18) was found.

Table 38

Distribution of Participating CAU Faculty Members' Stage in the Innovation-Decision Process by Age (N=273)

Stage in the Innovation-Decision Process	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	3.32	1.32	1.73	0.13
30-34	62	2.71	1.26		
35-39	66	2.71	1.40		
40-44	64	3.11	1.59		
45-54	37	3.30	1.54		
>54	12	2.67	0.99		

Note: 1=No Knowledge, 2=Knowledge, 3=Persuasion, 4=Decision, 5=Implementation, 6=Confirmation

Stage in the Innovation-Decision Process by Level of Education

Table 39 shows participants' stage in the innovation-decision process by level of education. Faculty members' stage in the innovation process differed significantly by level of education, *F* (2, 257)=5.05, *p*<0.05. Faculty with Bachelor's degree tended to be in later stage in the innovation-decision process than did faculty with a Master's degree. Faculty with a Master's degree tended to be in later stage in the innovation –decision process than did faculty with a doctoral degree. A small effect size (*f*=0.20) was found.

Table 39
Distribution of Participating CAU Faculty Members' Stage in the Innovation-Decision Process by Level of Education (N=273)

Stage in the Innovation-Decision Process	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	42	3.43	1.60	5.05*	0.00
Master	69	3.16	1.54		
Doctoral	149	2.73	1.27		

Note: 1=No Knowledge, 2=Knowledge, 3=Persuasion, 4=Decision, 5=Implementation, 6=Confirmation

Stage in the Innovation-Decision Process by Academic Rank

Table 40 shows participants' stage in the innovation-decision process by professional area. Faculty members' stage in the innovation-decision process did not differ by academic rank, *F* (2, 265)=0.12, *p*>0.05. A negligible effect size (*f*=0.03) was found.

Table 40
Distribution of Participating CAU Faculty Members' Stage in the Innovation-Decision Process by Academic Rank (N=273)

Stage in the Innovation-Decision Process	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	136	2.96	1.51	0.12	0.89
Professor	70	2.96	1.27		
Faculty with Other Titles	62	2.85	1.39		

Note: 1=No Knowledge, 2=Knowledge, 3=Persuasion, 4=Decision, 5=Implementation, 6=Confirmation

Stage in the Innovation-Decision Process by Teaching Experience

Table 41 shows participants' stage in the innovation-decision process by professional area. Faculty members' stage in the innovation-decision process differed significantly by teaching experience, *F* (4, 247)=3.93, *p*<0.05. Faculty with more years' teaching experience tended to be in later stage in the innovation-decision process than faculty with less teaching experience. However, faculty with about 15-19 years' teaching experience tended to be in later stage in the innovation-decision process than faculty with more than 19 years' teaching experience. A medium effect size (*f*=0.25) was found.

Table 41
Distribution of Participating CAU Faculty Members' Stage in the Innovation-Decision Process by Teaching Experience (N=273)

Stage in the Innovation-Decision Process	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	2.56	1.22	3.93*	0.00
5-9	57	2.89	1.32		
10-14	48	2.88	1.30		
15-19	40	3.68	1.72		
>19	48	2.98	1.47		

Note: 1=No Knowledge, 2=Knowledge, 3=Persuasion, 4=Decision, 5=Implementation, 6=Confirmation

Stage in the Innovation-Decision Process by Distance Education Experience

Table 42 shows participants' stage in the innovation-decision process by professional area. Faculty members' stage in the innovation-decision process differed significantly by distance education experience, *t* (265)=7.04, *p*<0.05, Faculty with distance education experience tended to be in later stage in the innovation-decision process than faculty without distance education experience. A large effect size (f=0.86) was found.

Table 42
Distribution of Participating CAU Faculty Members' Stage in the Innovation-Decision Process by Distance Education Experience (N=273)

Stage in the Innovation-Decision Process	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	74	3.81	1.68	7.04*	0.00
Have no distance education experience	193	2.58	1.12		

Note: 1=No Knowledge, 2=Knowledge, 3=Persuasion, 4=Decision, 5=Implementation, 6=Confirmation

Findings Related to Objective Six

The sixth objective was to examine the relationship between faculty members' selected personal characteristics and their perceptions about attributes of WBDE.

Perceived Attributes of WBDE by Professional Area

Table 43 shows distribution of participating CAU faculty perceptions about attributes of WBDE by professional area. Faculty perceptions about relative advantage of WBDE did not differ by professional area, F (11, 260)=0.74, p>0.05. A small effect size (f=0.18) was found. Faculty perceptions about compatibility of WBDE did not differ by professional area, F (11, 260)=1.35, p>0.05. A small effect size (f=0.24) was found. Faculty perceptions about complexity of WBDE did not differ by professional area, F (11, 260)=0.76, p>0.05. A small effect size (f=0.18) was found. Faculty perceptions about trialability of WBDE did not differ by professional area, F (11, 258)=1.64, p>0.05.

A medium effect size (*f*=0.26) was found. Faculty perceptions about observability of WBDE did not differ by professional area, F (11,260)=1.39, p>0.05, A small effect size (*f*=0.24) was found.

Table 43
Distribution of Participating CAU Faculty Perceptions about Attributes of WBDE by Professional Area (N=273)

Relative Advantage	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	3.74	0.74	0.74	0.70
Economics and Management	11	3.89	0.53		
Agronomy and Biotechnology	27	3.95	0.59		
Resource and Environment	41	3.90	0.59		
Basic Science and Technology	20	3.78	0.61		
Animal Science and Technology	42	3.77	0.71		
Biological Science	16	3.94	0.48		
Food Science and Nutrition Engineering	23	3.95	0.55		
Electronic and Electric Engineering	18	3.86	0.72		
Veterinary Medicine	14	3.82	0.82		
Engineering	16	3.95	0.48		
Water Conservancy and Civil Engineering	17	3.54	0.52		
Compatibility	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	3.94	0.45	1.35	0.20
Economics and Management	11	3.70	0.78		
Agronomy and Biotechnology	27	3.94	0.57		
Resource and Environment	41	3.88	0.66		
Basic Science and Technology	20	3.75	0.53		
Animal Science and Technology	42	3.94	0.44		
Biological Science	16	3.83	0.45		
Food Science and Nutrition Engineering	23	4.10	0.52		
Electronic and Electric Engineering	18	3.76	0.91		
Veterinary Medicine	14	4.04	0.56		
Engineering	16	4.20	0.56		
Water Conservancy and Civil Engineering	17	3.69	0.41		

Table 43 Continued

Complexity	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	3.54	0.74	0.76	0.68
Economics and Management	11	3.80	0.49		
Agronomy and Biotechnology	27	3.75	0.58		
Resource and Environment	41	3.78	0.69		
Basic Science and Technology	20	3.68	0.59		
Animal Science and Technology	42	3.82	0.54		
Biological Science	16	3.86	0.58		
Food Science and Nutrition Engineering	23	3.86	0.63		
Electronic and Electric Engineering	18	3.89	0.85		
Veterinary Medicine	14	3.96	0.49		
Engineering	16	3.83	0.64		
Water Conservancy and Civil Engineering	17	3.62	0.54		
Trialability	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	4.00	0.49	1.65	0.09
Economics and Management	11	4.18	0.49		
Agronomy and Biotechnology	27	3.91	0.65		
Resource and Environment	40	4.01	0.62		
Basic Science and Technology	20	4.01	0.69		
Animal Science and Technology	42	3.88	0.52		
Biological Science	15	4.03	0.52		
Food Science and Nutrition Engineering	23	4.15	0.55		
Electronic and Electric Engineering	18	4.15	0.88		
Veterinary Medicine	14	4.16	0.32		
Engineering	16	4.36	0.50		
Water Conservancy and Civil Engineering	17	3.68	0.66		

Table 43 Continued

Observability	n	M	SD	F	p
Professional Area					
Humanities and Social Science	27	4.22	0.42	1.39	0.18
Economics and Management	11	3.98	0.49		
Agronomy and Biotechnology	27	4.03	0.56		
Resource and Environment	41	3.99	0.49		
Basic Science and Technology	20	3.94	0.44		
Animal Science and Technology	42	3.90	0.49		
Biological Science	16	3.89	0.59		
Food Science and Nutrition Engineering	23	4.13	0.49		
Electronic and Electric Engineering	18	3.90	0.77		
Veterinary Medicine	14	4.13	0.55		
Engineering	16	4.20	0.60		
Water Conservancy and Civil Engineering	17	3.78	0.57		

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Perceived Attributes of WBDE by Gender

Table 44 shows distribution of participating CAU faculty perceptions about attributes of WBDE by gender. Faculty perceptions about relative advantage of WBDE did not differ by gender, t (271)=0.65, p>0.05. A negligible effect size (d=0.08) was found. Faculty perceptions about compatibility of WBDE did not differ by gender, t (271)=0.83, p>0.05. A negligible effect size (d=0.11) was found. Faculty perceptions about complexity of WBDE did not differ by gender, t (271)=0.58, p>0.05. A negligible effect size (d=0.06) was found. Faculty perceptions about trialability of WBDE did not differ by gender, t (269)=0.52, p>0.05, A negligible effect size (d=0.07) was found. Faculty perceptions about observability of WBDE did not differ by gender, t (271)=1.50, p>0.05, A negligible effect size (d=0.19) was found.

Table 44
Distribution of Participating CAU Faculty Perceptions about Attributes of WBDE by Gender (N=273)

Relative Advantage	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	179	3.86	0.65	0.65	0.52
Female	94	3.81	0.57		
Compatibility	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	179	3.93	0.57	0.83	0.41
Female	94	3.87	0.57		
Complexity	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	179	3.76	0.63	0.58	0.56
Female	94	3.80	0.61		
Trialability	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	179	4.03	0.59	0.52	0.60
Female	92	3.99	0.61		
Observability	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	179	4.04	0.52	1.50	0.14
Female	94	3.94	0.56		

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Perceived Attributes of WBDE by Age

Table 45 shows distribution of faculty perceptions about attributes of WBDE by age. Faculty perceptions about relative advantage of WBDE did not differ by age, F (5, 262)=0.38, p>0.05. A negligible effect size (f=0.08) was found. Faculty perceptions about compatibility of WBDE did not differ by age, F (5, 262)=0.87, p>0.05. A small effect size (f=0.13) was found. Faculty perceptions about complexity of WBDE did not differ by age, F (5, 262)=1.49, p>0.05. A small effect size (f=0.17) was found. Faculty perceptions about trialability of WBDE did not differ by age, F (5, 260)=1.17, p>0.05. A small effect size (*f*=0.15) was found. Faculty perceptions about observability of WBDE did not differ by age, *F* (5, 262)=0.32, p>0.05. A small effect size (*f*=0.08) was found.

Table 45
Distribution of Participating CAU Faculty Perceptions about Attributes of WBDE by Age (N=273)

Relative Advantage	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	3.84	0.68	0.38	0.87
30-34	62	3.92	0.50		
35-39	67	3.79	0.57		
40-44	68	3.80	0.67		
45-54	37	3.86	0.81		
>54	12	3.92	0.70		
Compatibility	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	3.76	0.73	0.87	0.50
30-34	62	3.87	0.55		
35-39	67	3.96	0.55		
40-44	68	3.88	0.51		
45-54	37	4.03	0.67		
>54	12	3.85	0.63		
Complexity	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	3.58	0.82	1.49	0.19
30-34	62	3.85	0.55		
35-39	67	3.86	0.52		
40-44	68	3.66	0.69		
45-54	37	3.87	0.65		
>54	12	3.75	0.59		
Trialability	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	3.86	0.73	1.17	0.33
30-34	62	4.13	0.53		
35-39	67	4.08	0.56		
40-44	68	3.95	0.55		
45-54	37	4.02	0.72		
>54	10	3.85	0.78		

Table 45 Continued

Observability	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	3.95	0.56	0.32	0.90
30-34	62	4.04	0.43		
35-39	67	3.98	0.54		
40-44	68	3.98	0.56		
45-54	37	4.06	0.65		
>54	12	4.10	0.60		

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Perceived Attributes of WBDE by Level of Education

Table 46 shows faculty perceptions about attributes WBDE by level of education. Faculty perceptions about relative advantage of WBDE did not differ by level of education, F (2, 262)=0.48, p>0.05. A negligible effect size (f=0.06) was found. Faculty perceptions about compatibility of WBDE did not differ by level of education, F (2, 262)=0.30, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about complexity of WBDE did not differ by level of education, F (2, 262)=0.40, p>0.05. A negligible effect size (f=0.06) was found. Faculty perceptions about trialability of WBDE did not differ by level of education, F (2, 260)=1.28, p>0.05. A small effect size (f=0.10) was found. Faculty perceptions about observability of WBDE did not differ by level of education, F (2, 262)=1.72, p>0.05. A small effect size (f=0.11) was found.

Table 46
Distribution of Participating CAU Faculty Perceptions about Attributes of WBDE by Level of Education (N=273)

Relative Advantage	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	44	3.76	0.78	0.48	0.62
Master	69	3.86	0.55		
Doctoral	152	3.86	0.60		
Compatibility	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	44	3.95	0.69	0.30	0.74
Master	69	3.93	0.61		
Doctoral	152	3.89	0.52		
Complexity	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	44	3.73	0.85	0.40	0.67
Master	69	3.74	0.63		
Doctoral	152	3.80	0.55		
Trialability	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	43	3.95	0.75	1.28	0.28
Master	69	4.12	0.59		
Doctoral	151	4.00	0.56		
Observability	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	44	4.07	0.60	1.72	0.18
Master	69	4.09	0.53		
Doctoral	152	3.96	0.51		

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Perceived Attributes of WBDE by Academic Rank

Table 47 shows the distribution of faculty perceptions about attributes of WBDE by academic rank. Faculty perceptions about relative advantage of WBDE did not differ by academic rank, F (2, 270)=0.46, p>0.05. A negligible effect size (f=0.06) was found. Faculty perceptions about compatibility of WBDE did not differ by academic rank, *F* (2, 270)=0.57, *p*>0.05. A negligible effect size (*f*=0.06) was found. Faculty perceptions about complexity of WBDE did not differ by academic rank, *F* (2, 270)=0.48, *p*>0.05. A negligible effect size (*f*=0.06) was found. Faculty perceptions about trialability of WBDE did not differ by academic rank, *F* (2, 268)=1.46, *p*>0.05. A small effect size (*f*=0.10) was found. Faculty perceptions about observability of WBDE did not differ by academic rank, *F* (2, 270)=1.64, *p*>0.05. A small effect size (*f*=0.11) was found.

Table 47
Distribution of Participating CAU Faculty Perceptions about Attributes of WBDE by Academic Rank (N=273)

Relative Advantage	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	138	3.85	0.65	0.46	0.63
Professor	72	3.88	0.62		
Faculty with Other Titles	63	3.78	0.59		
Compatibility	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	138	3.90	0.59	0.57	0.57
Professor	72	3.96	0.53		
Faculty with Other Titles	63	3.85	0.60		
Complexity	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	138	3.80	0.60	0.48	0.62
Professor	72	3.78	0.56		
Faculty with Other Titles	63	3.71	0.74		
Trialability	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	138	4.06	0.58	1.46	0.24
Professor	70	4.03	0.61		
Faculty with Other Titles	63	3.90	0.62		

Table 47 Continued

Observability	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	138	4.01	0.52	1.64	0.20
Professor	72	4.08	0.54		
Faculty with Other Titles	63	3.92	0.54		

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Perceived Attributes of WBDE by Teaching Experience

Table 48 shows the distribution of faculty perceptions about attributes of WBDE by teaching experience. Faculty perceptions about compatibility of WBDE differed significantly by teaching experience, F (4, 252)=2.65, p<0.05. A small effect size (f=0.21) was found. Faculty with more teaching experiences tended to agree with the existence of perceived compatibility of WBDE more than faculty with less teaching experience. However, faculty with 15-19 years' teaching experience tended to agree with the perceived compatibility of WBDE more than faculty with more teaching experience.

Faculty perceptions about relative advantage of WBDE did not differ by teaching experience, F (4, 252)=0.43, p>0.05. A negligible effect size (f=0.08) was found. Faculty perceptions about complexity of WBDE did not differ by teaching experience, F (4, 252)=1.11, p>0.05. A small effect size (f=0.13) was found. Faculty perceptions about trialability of WBDE did not differ by teaching experience, F (4, 250)=1.38, p>0.05. A small effect size (f=0.15) was found. Faculty perceptions about observability of WBDE did not differ by teaching experience, F (4, 252)=1.17, p>0.05. A small effect size (f=0.14) was found.

Table 48
Distribution of Participating CAU Faculty Perceptions about Attributes of WBDE by Teaching Experience (N=273)

Relative Advantage	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	3.89	0.49	0.43	0.79
5-9	58	3.80	0.60		
10-14	49	3.85	0.59		
15-19	41	3.95	0.66		
>19	50	3.82	0.82		
Compatibility	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	3.86	0.54	2.65*	0.03
5-9	58	3.79	0.60		
10-14	49	3.92	0.52		
15-19	41	4.15	0.54		
>19	50	3.93	0.62		
Complexity	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	3.73	0.63	1.11	0.35
5-9	58	3.79	0.56		
10-14	49	3.77	0.57		
15-19	41	3.98	0.57		
>19	50	3.75	0.74		
Trialability	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	4.00	0.51	1.38	0.24
5-9	58	4.06	0.61		
10-14	49	4.03	0.50		
15-19	41	4.21	0.55		
>19	48	3.93	0.75		
Observability	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	3.95	0.43	1.17	0.33
5-9	58	3.96	0.50		
10-14	49	4.04	0.48		
15-19	41	4.16	0.62		
>19	50	4.02	0.61		

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Perceived Attributes of WBDE by Distance Education Experience

Table 49 shows the distribution of faculty perceptions about attributes of WBDE by distance education experience. Faculty perceptions about compatibility of WBDE differed significantly by distance education experience, $t\ (270)=1.99$, $p<0.05$. Faculty with distance education experience tended to agree with the existence of perceived compatibility of WBDE more than faculty without distance education experience. A small effect size ($d=0.25$) was found.

Faculty perceptions about observability of WBDE differed significantly by distance education experience, $t\ (270)=3.56$, $p<0.05$. Faculty with distance education experience tended to agree with the existence of perceived observability of WBDE more than faculty without distance education experience. A small effect size ($d=0.46$) was found.

Faculty perceptions about relative advantage of WBDE did not differ by distance education experience, $t\ (270)=0.33$, $p>0.05$. A negligible effect size ($d=0.03$) was found. Faculty perceptions about complexity of WBDE did not differ by distance education experience, $t\ (270)=0.63$, $p>0.05$. A negligible effect size ($d=0.08$) was found. Faculty perceptions about trialability of WBDE did not differ by distance education experience, $t\ (268)=0.11$, $p>0.05$. A negligible effect size ($d=0.02$) was found.

Table 49
Distribution of Participating CAU Faculty Perceptions about Attributes of WBDE by Distance Education Experience (N=273)

Relative Advantage	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	78	3.83	0.76	0.33	0.74
Have no distance education experience	194	3.85	0.57		
Compatibility	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	78	4.01	0.69	1.99*	0.048
Have no distance education experience	194	3.86	0.52		
Complexity	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	78	3.81	0.75	0.63	0.53
Have no distance education experience	194	3.76	0.57		
Trialability	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	78	4.02	0.71	0.11	0.91
Have no distance education experience	192	4.01	0.55		
Observability	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	78	4.18	0.58	3.56*	0.00
Have no distance education experience	194	3.93	0.50		

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Findings Related to Objective Seven

Objective seven sought to examine the relationship between faculty members' selected personal characteristics and their perceptions about barriers to diffusion of WBDE.

Perceived Barriers to Diffusion of WBDE by Professional Area

Table 50 shows the distribution of participating CAU faculty perceptions about barriers to diffusion of WBDE by professional area. Faculty perceptions about concerns about time differed significantly by professional area, F (11, 258)=1.89, p<0.05. A medium effect size (f=0.28) was found. Faculty from the College of Humanities and Social Science, College of Resource and Environment, College of Economics and Management, College of Animal Science and Technology, College of Water Conservancy and Civil Engineering, College of Engineering, College of Agronomy and Biotechnology, College of Electronic and Electric Engineering, and College of Food Science and Nutrition tended to perceive concerns about time as a moderate barrier. Faculty from the College of Basic Science and Technology and College of Veterinary Medicine tended to perceive concerns about time as a weak barrier.

Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by professional area, F (11, 258)=1.14, p>0.05. A small effect size (f=0.22) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by professional area, F (11, 258)=1.01, p>0.05. A small effect size (f=0.21) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by professional area, F (11, 252)=0.97, p>0.05. A small effect size (f=0.21) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by professional area, F (11, 258)=1.57, p>0.05. A medium effect size (f=0.26) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by professional area, F (11, 260)=0.70, p>0.05. A small effect size (f=0.17) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by professional area, F (11, 260)=1.69, p>0.05. A medium effect size (f=0.27) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by professional area, *F* (11, 259)=1.34, *p*>0.05. A small effect size (*f*=0.24) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by professional area, *F* (11, 258)=1.21, *p*>0.05. A small effect size (*f*=0.23) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by professional area, *F* (11,160)=1.26, *p*>0.05. A small effect size (*f*=0.23) was found.

Table 50
Distribution of Participating CAU Faculty Perceptions about Barriers to Diffusion of WBDE by Professional Area (N=273)

Concerns about Time	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	3.31	0.91	1.89*	0.04
Economics and Management	11	3.11	0.56		
Agronomy and Biotechnology	27	2.69	0.97		
Resource and Environment	41	3.14	1.11		
Basic Science and Technology	19	2.47	0.72		
Animal Science and Technology	41	2.98	1.16		
Biological Science	16	2.69	0.73		
Food Science and Nutrition Engineering	23	2.50	0.89		
Electronic and Electric Engineering	18	2.69	1.20		
Veterinary Medicine	14	2.34	0.91		
Engineering	16	2.80	1.12		
Water Conservancy and Civil Engineering	17	2.85	1.28		

Table 50 Continued

Concerns about Incentives	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	2.96	0.87	1.14	0.33
Economics and Management	10	3.03	1.48		
Agronomy and Biotechnology	27	2.80	0.85		
Resource and Environment	41	2.83	0.81		
Basic Science and Technology	20	2.76	0.88		
Animal Science and Technology	42	2.94	0.81		
Biological Science	16	2.50	0.93		
Food Science and Nutrition Engineering	23	2.82	1.14		
Electronic and Electric Engineering	18	2.26	0.85		
Veterinary Medicine	14	2.54	0.99		
Engineering	16	2.67	1.10		
Water Conservancy and Civil Engineering	16	2.50	0.94		
WBDE Program Credibility	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	26	3.29	0.89	1.01	0.44
Economics and Management	11	2.89	1.18		
Agronomy and Biotechnology	26	3.15	0.92		
Resource and Environment	41	3.15	1.17		
Basic Science and Technology	20	3.10	0.96		
Animal Science and Technology	42	3.41	1.02		
Biological Science	16	3.20	0.89		
Food Science and Nutrition Engineering	23	3.24	1.31		
Electronic and Electric Engineering	18	2.61	0.81		
Veterinary Medicine	14	3.23	1.09		
Engineering	16	2.81	0.74		
Water Conservancy and Civil Engineering	17	3.10	0.99		
Financial Concerns	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	26	2.93	0.72	0.97	0.47
Economics and Management	11	2.52	1.03		
Agronomy and Biotechnology	26	2.93	0.91		
Resource and Environment	40	2.99	0.80		
Basic Science and Technology	20	2.90	0.94		
Animal Science and Technology	42	3.08	0.97		
Biological Science	16	2.67	0.73		
Food Science and Nutrition Engineering	21	3.04	0.99		
Electronic and Electric Engineering	17	2.74	0.86		
Veterinary Medicine	13	2.54	0.68		
Engineering	16	2.80	0.95		
Water Conservancy and Civil Engineering	16	2.58	0.96		

Table 50 Continued

Planning Issues	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	3.11	0.66	1.57	0.12
Economics and Management	11	3.41	1.10		
Agronomy and Biotechnology	27	2.86	0.99		
Resource and Environment	41	2.80	0.99		
Basic Science and Technology	20	3.26	0.77		
Animal Science and Technology	42	3.10	1.05		
Biological Science	16	2.61	0.94		
Food Science and Nutrition Engineering	22	2.89	0.89		
Electronic and Electric Engineering	18	2.72	0.85		
Veterinary Medicine	14	2.80	1.05		
Engineering	16	2.48	0.92		
Water Conservancy and Civil Engineering	16	2.58	0.96		
Fear of Technology	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	2.66	0.97	0.70	0.74
Economics and Management	11	2.80	1.25		
Agronomy and Biotechnology	27	2.56	0.73		
Resource and Environment	41	2.53	0.89		
Basic Science and Technology	20	2.88	1.00		
Animal Science and Technology	42	2.65	1.01		
Biological Science	16	2.30	0.89		
Food Science and Nutrition Engineering	23	2.62	0.96		
Electronic and Electric Engineering	18	2.33	0.99		
Veterinary Medicine	14	2.55	0.92		
Engineering	16	2.56	0.81		
Water Conservancy and Civil Engineering	17	2.26	0.92		
Conflict with Traditional Education	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	3.07	0.85	1.69	0.08
Economics and Management	11	2.57	1.11		
Agronomy and Biotechnology	27	2.64	0.83		
Resource and Environment	41	2.52	0.78		
Basic Science and Technology	20	2.74	0.84		
Animal Science and Technology	42	2.76	0.83		
Biological Science	16	2.28	0.88		
Food Science and Nutrition Engineering	23	2.54	1.07		
Electronic and Electric Engineering	18	2.43	1.26		
Veterinary Medicine	14	2.25	0.84		
Engineering	16	2.48	1.01		
Water Conservancy and Civil Engineering	17	2.16	0.75		

Table 50 Continued

Technical Expertise	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	3.13	0.92	1.34	0.20
Economics and Management	11	3.20	1.23		
Agronomy and Biotechnology	27	3.19	1.05		
Resource and Environment	41	2.74	0.98		
Basic Science and Technology	20	3.03	1.05		
Animal Science and Technology	41	2.98	0.96		
Biological Science	16	2.47	0.82		
Food Science and Nutrition Engineering	23	2.88	0.89		
Electronic and Electric Engineering	18	2.49	0.93		
Veterinary Medicine	14	2.57	1.01		
Engineering	16	2.88	0.85		
Water Conservancy and Civil Engineering	17	2.76	1.12		
Administrative Support	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	3.11	0.72	1.21	0.28
Economics and Management	11	3.16	1.08		
Agronomy and Biotechnology	27	2.96	0.78		
Resource and Environment	41	3.11	0.91		
Basic Science and Technology	20	2.88	0.78		
Animal Science and Technology	42	3.03	0.91		
Biological Science	16	2.55	0.81		
Food Science and Nutrition Engineering	23	2.79	0.84		
Electronic and Electric Engineering	17	2.76	0.70		
Veterinary Medicine	14	2.57	0.81		
Engineering	16	3.13	0.76		
Water Conservancy and Civil Engineering	16	2.77	0.90		

Table 50 Continued

Infrastructure	*n*	*M*	*SD*	*F*	*p*
Professional Area					
Humanities and Social Science	27	2.89	0.73	1.26	0.25
Economics and Management	11	2.75	1.05		
Agronomy and Biotechnology	27	3.01	0.94		
Resource and Environment	41	2.58	0.90		
Basic Science and Technology	20	3.01	1.03		
Animal Science and Technology	42	2.83	1.02		
Biological Science	16	2.67	0.79		
Food Science and Nutrition Engineering	23	2.47	1.09		
Electronic and Electric Engineering	18	2.51	0.95		
Veterinary Medicine	14	2.23	0.87		
Engineering	16	2.69	0.96		
Water Conservancy and Civil Engineering	17	2.49	1.06		

Note: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier

Perceived Barriers to Diffusion of WBDE by Gender

Table 51 shows the distribution of faculty perceptions about barriers to diffusion of WBDE by gender. Faculty perceptions about concerns about time as a barrier to diffusion of WBDE differed significantly by gender, t (269)=2.68, p<0.05. A small effect size (d=0.34) was found. Male faculty tended to perceive concerns about time as a moderate barrier to diffusion of WBDE more than female faculty.

Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE program did not differ by gender, t (269)=1.20, p>0.05. A negligible effect size (d=0.15) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion WBDE did not differ by gender, t (269)=0.52, p>0.05. A negligible effect size (d=0.07) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by gender, t (263)=0.49, p>0.05. A negligible effect size (*d*=0.07) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by gender, *t* (269)=0.08, *p*>0.05. A negligible effect size (*d*=0) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by gender, *t* (271)=0.55, *p*>0.05. A negligible effect size (*d*=0.06) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by gender, *t* (271)=0.21, *p*>0.05. A negligible effect size (*d*=0.02) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by gender, *t* (270)=0.92, *p*>0.05. A negligible effect size (*d*=0.11) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by gender, *t* (269)=0.24, *p*>0.05. A negligible effect size (*d*=0.02) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by gender, *t* (271)=0.81, *p*>0.05. A negligible effect size (*d*=0.10) was found.

Table 51
Distribution of Participating CAU Faculty Perceptions about Barriers to Diffusion of WBDE by Gender (N=273)

Concerns about Time	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	178	2.96	1.02	2.68*	0.01
Female	93	2.61	1.03		
Concerns about Incentives	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	178	2.80	0.89	1.20	0.23
Female	93	2.66	1.01		
WBDE Program Credibility	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	178	3.17	1.01	0.52	0.61
Female	93	3.10	1.04		

Table 51 Continued

Financial Concerns	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	176	2.85	0.87	0.49	0.62
Female	89	2.91	0.92		
Planning Issues	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	179	2.90	0.96	0.08	0.94
Female	92	2.90	0.95		
Fear of Technology	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	179	2.55	0.91	0.55	0.58
Female	94	2.61	0.97		
Conflict with Traditional Education	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	179	2.59	0.87	0.21	0.84
Female	94	2.57	1.00		
Technical Expertise	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	178	2.84	1.01	0.92	0.36
Female	94	2.95	.946		
Administrative Support	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	179	2.93	0.84	0.24	0.81
Female	92	2.95	0.86		
Infrastructure	*n*	*M*	*SD*	*t*	*p*
Gender					
Male	179	2.74	0.93	0.81	0.42
Female	94	2.64	1.01		

Note: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier

Perceived Barriers to Diffusion of WBDE by Age

Table 52 shows the distribution of faculty perceptions about barriers to diffusion of WBDE by age. Faculty perceptions about concerns about time as a barrier to diffusion of WBDE did not differ by age, F (5, 260)=1.05, p>0.05. A small effect size (f=0.14) was found. Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by age, F (5, 260)=0.73, p>0.05. A small effect size (f=0.12) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by age, F (5, 260)=1.28, p>0.05. A small effect size (f=0.16) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by age, F (5, 254)=0.45, p>0.05. A negligible effect size (f=0.09) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by age, F (5, 260)=0.58, p>0.05. A small effect size (f=0.11) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by age, F (5, 262)=0.75, p>0.05. A small effect size (f=0.12) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by age, F (5, 262)=0.74, p>0.05. A small effect size (f=0.12) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by age, F (5, 261)=1.57, p>0.05. A small effect size (f=0.17) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by age, F (5, 260)=0.33, p>0.05. A negligible effect size (f=0.08) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by age, F (5, 262)=0.68, p>0.05. A small effect size (f=0.11) was found.

Table 52
Distribution of Participating CAU Faculty Perceptions about Barriers to Diffusion of WBDE by Age (N=273)

Concerns about Time	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	2.55	1.08	1.05	0.39
30-34	60	2.98	1.02		
35-39	67	2.85	1.02		
40-44	68	2.99	1.06		
45-54	37	2.71	1.09		
>54	12	2.60	0.93		
Concerns about Incentives	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	2.50	1.03	0.73	0.60
30-34	62	2.78	0.85		
35-39	66	2.75	0.86		
40-44	68	2.79	1.01		
45-54	36	2.85	1.00		
>54	12	2.42	1.03		
WBDE Program Credibility	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	3.00	1.05	1.28	0.27
30-34	62	3.02	0.96		
35-39	66	3.18	1.06		
40-44	67	3.37	0.93		
45-54	37	2.91	1.11		
>54	12	3.17	1.30		
Financial Concerns	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	2.84	0.78	0.45	0.82
30-34	62	2.96	0.90		
35-39	66	2.86	0.84		
40-44	64	2.80	0.89		
45-54	36	2.94	1.01		
>54	10	2.60	0.79		

Table 52 Continued

Planning Issues	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	2.74	0.94	0.58	0.72
30-34	62	2.87	0.89		
35-39	67	3.03	0.84		
40-44	68	2.92	0.94		
45-54	36	2.78	1.24		
>54	11	2.70	1.13		
Fear of Technology	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	2.43	0.86	0.75	0.59
30-34	62	2.45	0.87		
35-39	67	2.54	0.91		
40-44	68	2.71	0.98		
45-54	37	2.67	1.02		
>54	12	2.48	1.00		
Conflict with Traditional Education	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	2.47	0.82	0.74	0.60
30-34	62	2.52	0.88		
35-39	67	2.61	0.84		
40-44	68	2.69	0.99		
45-54	37	2.66	1.03		
>54	12	2.23	0.85		
Technical Expertise	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	2.52	0.96	1.57	0.17
30-34	62	2.75	1.00		
35-39	67	3.06	0.93		
40-44	68	2.90	1.01		
45-54	36	2.73	1.04		
>54	12	3.17	0.95		
Administrative Support	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	2.76	0.88	0.33	0.89
30-34	62	2.91	0.88		
35-39	67	3.01	0.90		
40-44	68	2.90	0.67		
45-54	35	2.93	0.98		
>54	12	2.94	0.83		

Table 52 Continued

Infrastructure	*n*	*M*	*SD*	*F*	*p*
Age					
<30	22	2.70	0.84	0.68	0.64
30-34	62	2.70	0.90		
35-39	67	2.59	0.97		
40-44	68	2.81	0.99		
45-54	37	2.59	1.02		
>54	12	3.00	0.95		

Note: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier

Perceived Barriers to Diffusion of WBDE by Level of Education

Table 53 shows the distribution of faculty perceptions about barriers to diffusion of WBDE by level of education. Faculty perceptions about concerns about time as a barrier to diffusion of WBDE did not differ by level of education, F (2, 260)=0.66, p>0.05. A negligible effect size (f=0.07) was found. Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by level of education, F (2, 260)=0.35, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by level of education, F (2, 260)=2.13, p>0.05. A small effect size (f=0.13) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by level of education, F (2, 255)=1.49, p>0.05. A small effect size (f=0.11) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by level of education, F (2, 261)=0.79, p>0.05. A negligible effect size (f=0.08) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by level of education, F (2, 262)=0.40, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by level of education, F (2, 262)=0.28, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by level of education, F (2, 261)=0.36, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by level of education, F (2, 260)=0.83, p>0.05. A negligible effect size (f=0.08) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by level of education, F (2, 262)=0.30, p>0.05. A negligible effect size (f=0.05) was found.

Table 53
Distribution of Participating CAU Faculty Perceptions about Barriers to Diffusion of WBDE by Level of Education (N=273)

Concerns about Time	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	44	2.97	0.95	0.66	0.52
Master	69	2.91	1.15		
Doctoral	150	2.79	0.99		
Concerns about Incentives	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	43	2.85	0.89	0.35	0.71
Master	69	2.70	1.02		
Doctoral	151	2.77	0.90		
WBDE Program Credibility	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	43	3.15	1.00	2.13	0.12
Master	69	2.96	0.94		
Doctoral	151	3.26	1.04		

Table 53 Continued

WBDE Program Credibility	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	43	3.15	1.00	2.13	0.12
Master	69	2.96	0.94		
Doctoral	151	3.26	1.04		
Financial Concerns	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	43	2.99	0.80	1.49	0.23
Master	65	2.98	0.94		
Doctoral	150	2.80	0.87		
Planning Issues	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	44	2.82	1.05	0.79	0.46
Master	68	2.81	0.98		
Doctoral	152	2.96	0.91		
Fear of Technology	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	44	2.46	0.94	0.40	0.67
Master	69	2.58	0.94		
Doctoral	152	2.60	0.94		
Conflict with Traditional Education	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	44	2.68	1.16	0.28	0.76
Master	69	2.58	0.92		
Doctoral	152	2.56	0.84		
Technical Expertise	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	44	2.77	1.02	0.36	0.70
Master	69	2.92	1.05		
Doctoral	151	2.90	0.97		
Administrative Support	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	44	3.09	0.87	0.83	0.44
Master	67	2.88	0.86		
Doctoral	152	2.95	0.81		

Table 53 Continued

Infrastructure	*n*	*M*	*SD*	*F*	*p*
Level of Education					
Bachelor	44	2.77	.90	0.30	0.74
Master	69	2.76	1.02		
Doctoral	152	2.67	0.95		

Note: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier

Perceived Barriers to Diffusion of WBDE by Academic Rank

Table 54 shows the distribution of faculty perceptions about barriers to diffusion of WBDE by academic rank. Faculty perceptions about concerns about time as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 268)=0.20, p>0.05. A negligible effect size (f=0.04) was found. Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 268)=0.35, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 268)=1.22, p>0.05. A small effect size (f=0.10) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 262)=1.68, p>0.05. A small effect size (f=0.11) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 268)=0.46, p>0.05. A negligible effect size (f=0.06) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 270)=2.33, p>0.05. A small effect size (f=0.13) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 270)=0.78, p>0.05.

A negligible effect size (*f*=0.08) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by academic rank, *F* (2, 269)=1.17, *p*>0.05. A negligible effect size (*f*=0.09) was found. Faculty perceptions about administrative supports as a barrier to diffusion of WBDE did not differ by academic rank, *F* (2, 268)=0.63, *p*>0.05. A negligible effect size (*f*=0.07) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by academic rank, *F* (2, 270)=0.04, *p*>0.05. A negligible effect size (*f*=0.02) was found.

Table 54
Distribution of Participating CAU Faculty Perceptions about Barriers to Diffusion of WBDE by Academic Rank (N=273)

Concerns about Time	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	136	2.88	1.08	0.20	0.82
Professor	72	2.84	1.01		
Faculty with Other Titles	63	2.78	0.99		
Concerns about Incentives	***n***	***M***	***SD***	***F***	***p***
Academic Rank					
Associate Professor	137	2.80	0.91	0.35	0.71
Professor	72	2.68	0.98		
Faculty with Other Titles	62	2.74	0.95		
WBDE Program Credibility	***n***	***M***	***SD***	***F***	***p***
Academic Rank					
Associate Professor	136	3.15	1.04	1.22	0.30
Professor	72	3.27	1.04		
Faculty with Other Titles	63	2.99	0.95		
Financial Concerns	***n***	***M***	***SD***	***F***	***p***
Academic Rank					
Associate Professor	133	2.95	0.89	1.68	0.19
Professor	69	2.71	0.89		
Faculty with Other Titles	63	2.88	0.86		

Table 54 Continued

Planning Issues	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	137	2.95	0.96	0.46	0.63
Professor	71	2.88	0.99		
Faculty with Other Titles	63	2.81	0.90		
Fear of Technology	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	138	2.59	0.91	2.33	0.10
Professor	72	2.70	0.98		
Faculty with Other Titles	63	2.37	0.90		
Conflict with Traditional Education	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	138	2.64	0.92	0.78	0.46
Professor	72	2.58	0.92		
Faculty with Other Titles	63	2.46	0.89		
Technical Expertise	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	138	2.95	0.98	1.17	0.31
Professor	71	2.87	1.00		
Faculty with Other Titles	63	2.72	0.99		
Administrative Support	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	138	2.97	0.81	0.63	0.54
Professor	70	2.95	0.81		
Faculty with Other Titles	63	2.83	0.94		
Infrastructure	*n*	*M*	*SD*	*F*	*p*
Academic Rank					
Associate Professor	138	2.70	0.97	0.04	0.96
Professor	72	2.69	1.00		
Faculty with Other Titles	63	2.73	0.90		

Note: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier

Perceived Barriers to Diffusion of WBDE by Teaching Experience

Table 55 shows the distribution of faculty perceptions about barriers to diffusion of WBDE by teaching experience. Faculty perceptions about concerns about time as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 250)=0.96,

$p>0.05$. A small effect size ($f=0.12$) was found. Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 251)=0.24, $p>0.05$. A negligible effect size ($f=0.06$) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 250)=0.16, $p>0.05$. A negligible effect size ($f=0.05$) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 244)=0.70, $p>0.05$. A small effect size ($f=0.11$) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 250)=0.24, $p>0.05$. A negligible effect size ($f=0.06$) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 252)=0.75, $p>0.05$. A small effect size ($f=0.11$) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 252)=0.09, $p>0.05$. A negligible effect size ($f=0.04$) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 251)=0.74, $p>0.05$. A small effect size ($f=0.11$) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 251)=0.66, $p>0.05$. A small effect size ($f=0.10$) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 252)=0.39, $p>0.05$. A negligible effect size ($f=0.08$) was found.

Table 55

Distribution of Participating CAU Faculty Perceptions about Barriers to Diffusion of WBDE by Teaching Experience (N=273)

Concerns about Time	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	57	2.87	0.88	0.96	0.43
5-9	58	2.88	1.06		
10-14	49	2.76	1.16		
15-19	41	3.11	1.10		
>19	50	2.71	1.08		
Concerns about Incentives	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	2.82	0.80	0.24	0.92
5-9	58	2.71	0.94		
10-14	48	2.69	1.08		
15-19	41	2.80	0.95		
>19	50	2.69	0.96		
WBDE Program Credibility	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	3.12	0.99	0.16	0.96
5-9	58	3.16	0.90		
10-14	49	3.03	1.06		
15-19	40	3.15	1.03		
>19	49	3.16	1.15		
Financial Concerns	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	58	2.93	0.90	0.70	0.59
5-9	58	2.85	0.80		
10-14	48	2.73	0.92		
15-19	38	3.03	0.81		
>19	47	2.82	0.98		
Planning Issues	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	2.94	0.87	0.24	0.92
5-9	58	2.82	0.93		
10-14	49	2.93	0.90		
15-19	41	2.89	1.01		
>19	48	2.79	1.12		

Table 55 Continued

Fear of Technology	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	2.44	0.72	0.75	0.56
5-9	58	2.47	0.92		
10-14	49	2.71	1.02		
15-19	41	2.60	0.89		
>19	50	2.57	1.03		
Conflict with Traditional Education	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	2.53	0.83	0.09	0.99
5-9	58	2.59	0.85		
10-14	49	2.56	1.00		
15-19	41	2.61	0.93		
>19	50	2.61	0.91		
Technical Expertise	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	2.82	0.97	0.74	0.57
5-9	58	2.84	0.93		
10-14	49	3.07	1.02		
15-19	41	2.87	1.03		
>19	49	2.74	1.01		
Administrative Support	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	2.85	0.82	0.66	0.62
5-9	58	3.08	0.84		
10-14	49	2.93	0.87		
15-19	41	2.90	0.78		
>19	49	2.88	0.85		
Infrastructure	*n*	*M*	*SD*	*F*	*p*
Teaching Experience					
<5	59	2.74	0.84	0.39	0.81
5-9	58	2.56	0.96		
10-14	49	2.72	1.00		
15-19	41	2.76	1.02		
>19	50	2.68	0.99		

Note: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier

Perceived Barriers to Diffusion of WBDE by Distance Education Experience

Table 56 shows the distribution of faculty perceptions about barriers to diffusion of WBDE by distance education experience. Faculty perceptions about concerns about time as a barrier to diffusion of WBDE did not differ by distance education experience, t (268)=0.88, p>0.05. A negligible effect size (d=0.11) was found. Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by distance education experience, t (268)=0.16, p>0.05. A negligible effect size (d=0.02) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by distance education experience, t (268)=0.13, p>0.05. A negligible effect size (d=0.01) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by distance education experience, t (263)=1.20, p>0.05. A negligible effect size (d=0.16) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by distance education experience, t (268)=0.72, p>0.05. A negligible effect size (d=0.09) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by distance education experience, t (270)=1.20, p>0.05. A negligible effect size (d=0.16) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by distance education experience, t (270)=1.90, p>0.05. A small effect size (d=0.24) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by distance education experience, t (269)=0.53, p>0.05. A negligible effect size (d=0.07) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by distance education experience, t (268)=0.34, p>0.05. A negligible effect size (d=0.05) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by distance education experience, t (270)=0.39, p>0.05. A negligible effect size (d=0.05) was found.

Table 56
Distribution of Participating CAU Faculty Perceptions about Barriers to Diffusion of WBDE by Distance Education Experience (N=273)

Concerns about Time	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	77	2.94	1.11	0.88	0.38
Have no distance education experience	193	2.82	1.00		
Concerns about Incentives	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	77	2.77	0.99	0.16	0.87
Have no distance education experience	193	2.75	0.92		
WBDE Program Credibility	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	77	3.16	1.06	0.13	0.90
Have no distance education experience	193	3.15	1.00		
Financial Concerns	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	77	2.97	0.91	1.20	0.23
Have no distance education experience	188	2.83	0.87		
Planning Issues	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	78	2.96	1.02	0.72	0.47
Have no distance education experience	192	2.87	0.93		
Fear of Technology	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	78	2.68	0.96	1.20	0.23
Have no distance education experience	194	2.53	0.92		
Conflict with Traditional Education	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	78	2.75	1.04	1.90	0.06
Have no distance education experience	194	2.52	0.86		

Table 56 Continued

Technical Expertise	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	78	2.82	1.00	0.53	0.60
Have no distance education experience	193	2.89	.99		
Administrative Support	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	77	2.96	.085	0.34	0.74
Have no distance education experience	193	2.92	0.84		
Infrastructure	*n*	*M*	*SD*	*t*	*p*
Distance Education Experience					
Have distance education experience	78	2.73	0.97	0.39	0.70
Have no distance education experience	194	2.68	0.95		

Note: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5=Very Strong Barrier

Findings Related to Objective Eight

The eighth objective was to examine the relationship between faculty members' stage in the innovation-decision process and their perceptions about attributes of WBDE.

Table 57 shows the distribution of faculty perceptions about attributes of WBDE by stage in the innovation-decision process. Faculty perceptions about compatibility of WBDE differed significantly by stage in the innovation-decision process, F (5,262)=4.02, p<0.05. Faculty who were in later stage in the innovation-decision process tended to agree with the existence of perceived relative advantage of WBDE more than faculty who stayed in earlier stages. A medium effect size (f=0.28) was found.

Faculty perceptions about complexity of WBDE differed significantly by stage in the innovation-decision process, F (5,262)=3.09, p<0.05. Faculty who were in later stage in the innovation-decision process tended to agree with the existence of perceived complexity of WBDE more than faculty who stayed in earlier stages. A small effect size (*f*=0.24) was found.

Faculty perceptions about trialability of WBDE differed significantly by stage in the innovation-decision process, F (5,260)=4.92, p<0.05. Faculty who were in later stage in the innovation-decision process tended to agree with the existence of perceived trialability of WBDE more than faculty who stayed in earlier stages. A medium effect size (*f*=0.31) was found.

Faculty perceptions about observability of WBDE differed significantly by stage in the innovation-decision process, F (5,262)=8.69, p<0.05. Faculty who were in later stage in the innovation-decision process tended to agree with the existence of perceived observability of WBDE more than faculty who stayed in earlier stages. A large effect size (*f*=0.41) was found.

Faculty perceptions about relative advantage of WBDE did not differ by stage in the innovation-decision process, F (5,262)=1.68, p>0.05. A small effect size (*f*=0.18) was found.

Table 57

Description of Faculty Perceptions about Attributes of WBDE by Stage (N=273)

Relative Advantage	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	3.59	0.53	1.68	0.14
Knowledge	81	3.82	0.53		
Persuasion	71	3.89	0.65		
Decision	39	3.96	0.56		
Implementation	17	3.94	0.82		
Confirmation	22	3.88	0.92		

Table 57 Continued

Compatibility	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	3.63	0.59	4.02*	0.00
Knowledge	81	3.87	0.48		
Persuasion	71	3.94	0.49		
Decision	39	3.98	0.56		
Implementation	17	4.10	0.94		
Confirmation	22	4.22	0.55		
Complexity	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	3.53	0.76	3.09*	0.01
Knowledge	81	3.75	0.51		
Persuasion	71	3.73	0.59		
Decision	39	4.00	0.49		
Implementation	17	3.79	0.91		
Confirmation	22	4.03	0.71		
Trialability	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	3.80	0.68	4.92*	0.00
Knowledge	81	3.86	0.53		
Persuasion	69	4.04	0.51		
Decision	39	4.22	0.50		
Implementation	17	4.16	0.95		
Confirmation	22	4.36	0.54		
Observability	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	3.72	0.49	8.69*	0.00
Knowledge	81	3.88	0.44		
Persuasion	71	4.02	0.51		
Decision	39	4.17	0.44		
Implementation	17	4.26	0.79		
Confirmation	22	4.44	0.52		

Note: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Findings Related to Objective Nine

The ninth objective was to examine the relationship between faculty members' stage in the innovation-decision process and their perceptions about barriers to diffusion of WBDE.

Table 58 shows the distribution of faculty perceptions about barriers to diffusion of WBDE by stage in the innovation-decision process. Faculty perceptions about WBDE program credibility as a perceived barrier to diffusion of WBDE differed significantly by stage in the innovation-decision process, F (5,261)=3.18, p<0.05. Faculty who were in the stages of “confirmation” or “implementation” tended to perceive WBDE program credibility as a moderate barrier to diffusion of WBDE more than faculty who were in the stages of “no knowledge” or “knowledge.” However, faculty who were in the stages of “no knowledge” or “knowledge” tended to perceive WBDE program credibility as a moderate barrier more than faculty who were in the stages of “persuasion” or “decision.” A medium effect size (f=0.25) was found.

Faculty perceptions about concerns about time as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5,260)=0.81, p>0.05. A small effect size (f=0.12) was found. Faculty perceptions about concerns about incentives to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5,260)=0.96, p>0.05. A small effect size (f=0.14) was found. Faculty perceptions about financial concerns as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5,254)=0.81, p>0.05. A small effect size (f=0.13) was found. Faculty perceptions about planning issues as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5,260)=0.45, p>0.05. A negligible effect size (f=0.09) was found. Faculty perceptions about fear of technology as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5,262)=0.82, p>0.05. A small effect size (*f*=0.13) was found. Faculty perceptions about conflict with traditional education as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5,262)=0.40, p>0.05. A negligible effect size (*f*=0.09) was found. Faculty perceptions about technical expertise as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5,261)=0.77, p>0.05. A small effect size (*f*=0.12) was found. Faculty perceptions about administrative support as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5,260)=0.76, p>0.05. A small effect size (*f*=0.12) was found. Faculty perceptions about infrastructure as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5,262)=0.46, p>0.05. A negligible effect size (*f*=0.09) was found.

Table 58
Description of Faculty Perceptions about Barriers to Diffusion of WBDE by Stage (N=273)

Concerns about Time	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	2.76	0.90	0.81	0.55
Knowledge	80	2.96	0.92		
Persuasion	70	2.87	1.15		
Decision	39	2.58	1.03		
Implementation	17	2.94	1.15		
Confirmation	22	2.77	1.21		
Concerns about Incentives	***n***	***M***	***SD***	***F***	***p***
Stage					
No knowledge	37	2.84	0.82	0.96	0.44
Knowledge	81	2.77	1.01		
Persuasion	71	2.58	0.86		
Decision	38	2.68	0.96		
Implementation	17	2.87	0.89		
Confirmation	22	3.01	0.98		

Table 58 Continued

WBDE Program Credibility	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	37	2.84	0.82	3.18*	0.01
Knowledge	81	2.77	1.01		
Persuasion	71	2.58	0.86		
Decision	38	2.68	0.96		
Implementation	17	2.87	0.89		
Confirmation	22	3.01	0.98		
Financial Concerns	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	2.68	0.84	0.81	0.54
Knowledge	81	2.82	0.85		
Persuasion	67	2.94	0.90		
Decision	37	3.03	0.92		
Implementation	17	3.01	0.96		
Confirmation	20	2.85	0.93		
Planning Issues	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	2.80	1.01	0.45	0.82
Knowledge	81	2.95	0.86		
Persuasion	69	2.86	1.00		
Decision	39	3.01	1.06		
Implementation	17	3.03	0.81		
Confirmation	22	2.73	1.09		
Fear of Technology	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	2.63	0.98	0.82	0.53
Knowledge	81	2.70	0.92		
Persuasion	71	2.43	0.92		
Decision	39	2.50	0.98		
Implementation	17	2.60	0.99		
Confirmation	22	2.44	0.66		
Conflict with Traditional Education	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	2.43	0.85	0.40	0.85
Knowledge	81	2.67	0.85		
Persuasion	71	2.55	0.93		
Decision	39	2.53	1.05		
Implementation	17	2.57	0.95		
Confirmation	22	2.63	1.04		

Table 58 Continued

Technical Expertise	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	2.95	1.10	0.77	0.58
Knowledge	81	2.77	0.96		
Persuasion	70	2.88	1.00		
Decision	39	3.01	1.08		
Implementation	17	2.62	0.75		
Confirmation	22	3.07	0.90		
Administrative Support	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	2.90	0.83	0.76	0.58
Knowledge	81	2.92	0.81		
Persuasion	70	2.88	0.90		
Decision	38	2.84	0.92		
Implementation	17	3.25	0.65		
Confirmation	22	3.08	0.84		
Infrastructure	*n*	*M*	*SD*	*F*	*p*
Stage					
No knowledge	38	2.61	0.90	0.46	0.80
Knowledge	81	2.62	0.97		
Persuasion	71	2.77	0.97		
Decision	39	2.84	1.10		
Implementation	17	2.62	0.79		
Confirmation	22	2.74	0.93		

Note: 1=No Barrier, 2=Weak Barrier, 3=Moderate Barrier, 4=Strong Barrier, 5= Very Strong Barrier

Findings Related to Objective Ten

The tenth objective was to examine the relationship between faculty perceptions about attributes of WBDE and their perceptions about barriers to diffusion of WBDE.

The correlates between faculty perceptions about relative advantage of WBDE and their perceptions about barriers to diffusion of WBDE are given in Table 59. Significant, low negative relationships were found between perceived relative advantage of WBDE and WBDE program credibility (r (271)=-0.19, p<0.05) and planning issues (*r* (271)=-0.19, *p*<0.05) as perceived barriers to diffusion of WBDE. All other correlations were not significant and the relationships were negligible and ranged between *r*=-0.07 to *r*=0.01.

Table 59
Correlation and Magnitude of Relationship between Faculty Perceptions about Relative Advantage of WBDE and Their Perceptions about Barriers to Diffusion of WBDE (N=273)

Barriers to Diffusion	Relative Advantage	
	Coefficient	Magnitude
WBDE Program Credibility	-0.19*	Low
Planning Issues	-0.19*	Low
Concerns about Incentives	-0.07	Negligible
Technical Expertise	0.07	Negligible
Infrastructure	0.07	Negligible
Conflict with Traditional Education	0.03	Negligible
Financial Concerns	0.02	Negligible
Fear of Technology	0.02	Negligible
Concerns about Time	0.01	Negligible
Administrative Support	0.01	Negligible

Note: Coefficient reported as Pearson's Product-Moment Correlations; *p*<0.05.

The correlations between faculty perceptions about compatibility of WBDE and their perceptions about barriers to diffusion of WBDE are given in Table 60. A significant, low negative relationship was found between perceived compatibility of WBDE and planning issues (*r* (271)=-0.16, *p*<0.05) as a perceived barrier to diffusion of WBDE. All other correlations were not significant and the relationships were negligible to low and ranged between *r*=-0.11 to *r*=0.00.

Table 60
Correlation and Magnitude of Relationship between Faculty Perceptions about Compatibility of WBDE and Their Perceptions about Barriers to Diffusion of WBDE (N=273)

Barriers to Diffusion	Compatibility	
	Coefficient	Magnitude
Planning Issues	-0.16*	Low
WBDE Program Credibility	-0.11	Low
Fear of Technology	-0.07	Negligible
Concerns about Incentives	-0.07	Negligible
Technical Expertise	-0.06	Negligible
Infrastructure	-0.06	Negligible
Administrative Support	-0.06	Negligible
Concerns about Time	-0.03	Negligible
Financial Concerns	0.01	Negligible
Conflict with Traditional Education	0.00	Negligible

Note: Coefficient reported as Pearson's Product-Moment Correlations; $p<0.05$.

The correlations between faculty perceptions about complexity of WBDE and their perceptions about barriers to diffusion of WBDE are given in Table 61. Significant, low negative relationships were found between perceived complexity of WBDE and WBDE program credibility (r (271)=-0.19, $p<0.05$), technical expertise (r (272)=-0.17, $p<0.05$), administrative support (r (271)=-0.17, $p<0.05$), planning issues (r (271)=-0.15, $p<0.05$), financial concerns (r (265)=-0.13, $p<0.05$), and concerns about time (r (271)=-0.13, $p<0.05$) as perceived barriers to diffusion of WBDE . All other correlations were not significant and the relationships were negligible to low and ranged between r=-0.12 to r=-0.03.

Table 61
Correlation and Magnitude of Relationship between Faculty Perceptions about Complexity of WBDE and Their Perceptions about Barriers to Diffusion of WBDE (N=273)

Barriers to Diffusion	Complexity	
	Coefficient	Magnitude
WBDE Program Credibility	-0.19*	Low
Technical Expertise	-0.17*	Low
Administrative Support	-0.17*	Low
Planning Issues	-0.15*	Low
Financial Concerns	-0.13*	Low
Concerns about Time	-0.13*	Low
Concerns about Incentives	-0.12	Low
Infrastructure	-0.09	Negligible
Fear of Technology	-0.09	Negligible
Conflict with Traditional Education	-0.03	Negligible

Note: Coefficient reported as Pearson's Product-Moment Correlations; $p<0.05$.

The correlations between faculty perceptions about trialability of WBDE and their perceptions about barriers to diffusion of WBDE are given in Table 62. A significant, low negative relationship was found between perceived trialability of WBDE and WBDE program credibility (r (269) =-0.19, $p<0.05$) as a perceived barrier to diffusion of WBDE. All other correlations were not significant and the relationships were negligible to low and ranged between r=-0.10 to r=0.00.

Table 62
Correlation and Magnitude of Relationship between Faculty Perceptions about Trialability of WBDE and Their Perceptions about Barriers to Diffusion of WBDE (N=273)

Barriers to Diffusion	Trialability	
	Coefficient	Magnitude
WBDE Program Credibility	-0.19*	Low
Conflict with Traditional Education	-0.10	Low
Concerns about Time	-0.09	Negligible
Fear of Technology	-0.09	Negligible
Technical Expertise	0.05	Negligible
Planning Issues	-0.05	Negligible
Infrastructure	-0.02	Negligible
Concerns about Incentives	-0.02	Negligible
Administrative Support	-0.01	Negligible
Financial Concerns	0.00	Negligible

Note: Coefficient reported as Pearson's Product-Moment Correlations; $p<0.05$.

The correlations between faculty perceptions about observability of WBDE and their perceptions about barriers to diffusion of WBDE are given in Table 63. All correlations were not significant and the relationships were negligible to low and ranged between r=-0.11to r=0.01.

Table 63
Correlation and Magnitude of Relationship between Faculty Perceptions about Observability of WBDE and Their Perceptions about Barriers to Diffusion of WBDE (N=273)

Barriers to Diffusion	Observability	
	Coefficient	Magnitude
Planning Issues	-0.11	Low
WBDE Program Credibility	-0.11	Low
Infrastructure	0.08	Negligible
Financial Concerns	0.07	Negligible
Concerns about Incentives	-0.06	Negligible
Fear of Technology	-0.05	Negligible
Conflict with Traditional Education	0.05	Negligible
Concerns about Time	0.03	Negligible
Technical Expertise	0.02	Negligible
Administrative Support	0.01	Negligible

Note: Coefficient reported as Pearson's Product-Moment Correlations; $p<0.05$.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The objectives of the study, summary of methodology, summary of key findings/conclusions for each objectives, additional implications and recommendations, and recommendations for further studies are presented in this chapter.

Objectives of the Study

This study was conducted to find out faculty perceptions about attributes and barriers impacting diffusion of WBDE at the China Agricultural University. There ere six specific objectives identified for this purpose:

1. Describe faculty by selected personal characteristics.
2. Describe faculty by their current stage in the innovation-decision process related to WBDE (no knowledge, knowledge, persuasion, decision, implementation, and confirmation).
3. Describe faculty according to their perceptions about attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability).
4. Describe faculty according to their perceptions about barriers to diffusion of WBDE (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure).
5. Examine the relationship between faculty members' selected personal characteristics and their stage in the innovation-decision process.

6. Examine the relationship between faculty members' selected personal characteristics and their perceptions about attributes of WBDE.
7. Examine the relationship between faculty members' selected personal characteristics and their perceptions about barriers to diffusion of WBDE.
8. Examine the relationship between faculty members' stage in the innovation-decision process and their perceptions about attributes of WBDE.
9. Examine the relationship between faculty members' stage in the innovation-decision process and their perceptions about barriers to diffusion of WBDE.
10. Examine the relationship between faculty perceptions about attributes of WBDE and their perceptions about barriers to diffusion of WBDE.

Summary of Methodology

Type of Research

The research design used for this study was descriptive and correlational in nature. The study was designed to examine China Agricultural University faculty perceptions about attributes and barriers impacting diffusion of WBDE. The theoretical framework for this study was based on: (1) Rogers' (2003) model of the innovation-decision process; (2) Rogers' (2003) attributes of innovation theory; (3) Rogers' (2003) characteristics of adopter categories; (4) Moore and Benbasat's (1991) measurements of the attributes of innovation, and (5) Berge's (1999) study about barriers to distance education.

The study has two groups of dependent variables and seven independent variables. The first group of dependent variables included faculty perceptions about five attributes of WBDE: relative advantage, compatibility, complexity, trialability, and observability. The second group of dependent variables included faculty perceptions about ten barriers to diffusion of WBDE: concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure. The seven independent variables were professional area, gender, age, educational level, academic rank, teaching experiences, and distance education experience.

Pilot Test

Pilot study was performed with faculty from the Department of Agricultural Education at Texas A&M University. This group was not part of the sample population. Random sample procedures were used for the pilot study and 20 faculty were randomly selected to participate in the pilot study. A pilot cover letter and pilot instrument was sent to each participant on June 27, 2003 and data collection ceased on July 11, 2003 with 12 (60%) respondents. Reliability for the instrument was estimated by calculating a Cronbach's alpha coefficient. Reliabilities for perceived attributes and perceived barriers impacting diffusion of WBDE were relative advantage, r=0.74; compatibility, r=0.42; complexity, r=0.83; trialability, r=0.90; observability, r=0.78; faculty concerns about comprehension and time, r=0.63; WBDE program credibility, r=0.65; financial concerns, *r*=0.77; planning issues, *r*=0.76; conflict with traditional education, *r*=0.73, fear of technology, *r*=0.73; technical expertise, *r*=0.84; administrative, *r*=0.78; and infrastructure, *r*=0.70.

Because results indicated that three items---perceived compatibility of WBDE, concerns about compensation and time as a perceived barrier to diffusion of WBDE, and WBDE program credibility as a perceived barrier to diffusion of WBDE --- had relatively low reliabilities, a second pilot study was conducted after reconstituting these sections of the questionnaire. The item “faculty concerns about compensation and time” was split into two items: concerns about time and concerns about incentives. Another pilot cover letter and revised pilot instrument was sent to 20 randomly selected faculty on July 14 and data collection ceased on July 17, 2003 with 11 (55%) respondents. A new reliability test was conducted by recalculating Cronbach’s Alpha coefficient. The reliabilities of the revised items were: compatibility, *r*=0.92; concerns about time, *r*=0.89; concerns about incentives, *r*=0.95; and WBDE program credibility, *r*=0.94. Reliability for faculty perceptions about attributes of WBDE was *r*=0.84. Reliability for faculty perceptions about barriers to diffusion of WBDE was *r*=0.78.

Selection of Respondents

The target population for this study was all faculty at the China Agricultural University (*N*=1170). Among the 1170 faculty, about 70 faculty were participating in the WBDE programs and 1100 faculty were not currently involved in WBDE programs. Random sampling and stratified sampling were used for the study (Gall, Borg, & Gall, 1996). The sample number was derived by using the table of “Determining Sample Size for Research Activities” (Krejcie & Morgan, 1970). Fifty faculty who were currently involved in WBDE programs and 250 faculty who currently were not involved in WBDE programs were randomly drawn from across the China Agricultural University.

Instrumentation

The research instrument consisted of a four-part questionnaire, which was designed based on the review of literature (Berge, 1999; Moore & Benbasat, 1991; Rogers, 2003). The first part of the instrument was designed to measure participants' stages in the innovation-decision process related to WBDE. Rogers’ (2003) model of five stages in the innovation-decision process was adopted and modified as the theoretical base for this part. Besides the five stages (knowledge, persuasion, decision, implementation, and confirmation) mentioned in the model, another stage named “no knowledge” was added as the first stage in the innovation-decision process. Participants were asked to indicate their attitudes toward the statement “Limited access to higher education by students is a big problem for Chinese institutions of higher education” by choosing “I agree,” “I disagree,” or “I am not sure.” Six statements were used to indicate participants’ current stage (no knowledge, knowledge, persuasion, decision, implementation, or confirmation) in the innovation-decision process related to WBDE. The participants were asked to select one statement that best reflected their current stage in the process. The level of measurements for these two questions was nominal.

The second part was designed to measure participants' perceptions about attributes of WBDE. Rogers' (2003) five attributes of innovation (relative advantage, compatibility, complexity, trialability, and observability) were used as the theoretical based for the part. Moore and Benbasat's (1991) measurements of the main attributes of innovation were used and modified as the instrumental base for this part. Participants were asked to indicate their perceptions about the five attributes of WBDE by responding to a series of statements on a five point Likert-type scale. The points on the scale were: 1= Strongly Disagree (SD); 2=Disagree (D); 3=Neutral (N); 4=Agree (A); and 5=Strongly Agree (SA). The level of measurement for these variables was interval.

The third part of the instrument was designed to measure participants' perceptions about barriers to diffusion of WBDE. Based on Berge's (1999) study about barriers to distance education, ten barriers were summarized as the major barriers to current diffusion of WBDE. These barriers included: concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, fear of technology, conflict with traditional education, technical expertise, administrative support, and infrastructure. Participants were asked to indicate their perceptions about the ten barriers by responding to a series of statements on a five point Likert-type scale. The points on the scale were: 1=No Barrier (NB); 2=Weak Barrier (WB); 3=Moderate Barrier (MB); 4=Strong Barrier (SB); and 5=Very Strong Barrier (VSB). The level of measurement for these variables was interval.

The fourth part of the instrument was designed to gather data on participants' personal characteristics. Rogers' (2003) characteristics of adopter categories were used as the theoretical based for the part. Professional area was measured as the college to which participant belongs. The level of measurement for professional area was nominal. Gender was measured as either male or female. The level of measurement for gender was nominal. Age was measured as the number of years since birth. The level of measurement for age was ratio. Level of education was measured as bachelor, master, or doctoral degree. The level of measurement for level of education was ordinal. Academic rank was measured as follows: associate professor, professor, or faculty with other titles. The level of measurement for academic rank was ordinal. Teaching experience was measured by the number of years for which participant has been teaching at university level. The level of measurement for teaching experience was interval. Distance education experience related to WBDE program, TV or broadcasting distance program, correspondence program, or others was measured by "yes" or "no" choice. The level of measurement for distance education experience was nominal. If participant replied "yes," the length of using each distance education program was measured by the number of years for which participant has been using the program. The level of measurement for length of distance education experience was interval.

Validity and Reliability

The instrument was tested for content and face validity by a panel of experts consisting of faculty who have expertise in adoption/diffusion research. Experts reviewed about the instrument for controlling internal validity and measurement error.

Wording and adjusting of the instrument was made based on feedbacks from the expert panel and from an Ad hoc advisor, Dr. Gao.

The responses from randomly selected faculty members in the Department of Agricultural Education, Texas A&M University, were used to test for reliability using Cronbach's Alpha coefficient. Reliability for faculty perceptions about attributes of WBDE was r=0.84. Reliability for faculty perceptions about barriers to diffusion of WBDE was r=0.78.

Data Collection

Data were collected by in-person delivered survey. Starting from December 8, 2003, the questionnaire, together with a cover letter that introduced the research project, was delivered to randomly selected sample faculty at the China Agricultural University. The sample faculty included 50 faculty with WBDE experience and 250 faculty without WBDE experience. Participants were asked to fill in the questionnaire in their spare time and the researcher picked up the questionnaires after it was finished. Participants were assured that their responses were confidential and only group data would be reported. The questionnaires were coded for convenient analysis. Non-respondents were reminded after several days' non-response. Data collection ceased on January 2, 2004. A total response rate of 96.3% (n=289) was obtained. Of the surveys returned, 16 were incomplete, resulting in a usable response rate of 91% (n=273) for the study.

Comparing early versus late responses controlled for non-response error. Late responses were compared to early responses on faculty members' attitude toward statement "limited access to higher education by students is a big problem for Chinese institutions of higher education," faculty members' stage in the innovation-decision process, faculty perceptions about attributes of WBDE, and faculty perceptions about barriers to diffusion of WBDE. No significant difference was found, which means the results of the study could be generalized to the target population (Lindner, Murphy, & Briers, 2001).

Data Analysis

The collected data were analyzed using the Statistical Package for Social Sciences (SPSS, 11.0). Descriptive statistics were used to describe each variable. Alpha for all statistical procedures was set a priori at 0.05.

To assess the magnitude of statistical differences, effect sizes were calculated, interpreted, and reported (Cohen, 1988). Interpretations for *t*-tests were based on the Cohen Conversion: negligible size, $d<0.20$; small effect size, $0.50>d\geq0.20$; medium effect size, $0.80>d\geq0.50$; and large effect size, $d\geq0.80$. Interpretations for ANOVA were based on the Cohen Conversion: negligible size, $f<0.10$; small effect size, $0.25>f\geq0.10$; medium effect size, $0.40>f\geq0.25$; and large effect size, $f\geq0.40$.

For objective one, the variables about personal characteristics (professional area, gender, age, level of education, academic rank, length of teacher experience at university, and experiences about distance education program) were analyzed and described by calculating frequencies and percentages by level of response.

For objective two, the variable about faculty members' current stage (no knowledge, knowledge, persuasion, decision, implementation, and confirmation) in the innovation-decision process was analyzed and described by calculating frequencies and percentages by level of response.

For objective three, the variables about faculty perceptions about attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability) were analyzed and described by calculating frequencies and percentages by level of response.

For objective four, the variables about faculty perceptions about barriers to diffusion of WBDE (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure) were analyzed and described by calculating frequencies and percentages by level of response.

For objective five, the variables faculty members' selected personal characteristics (professional area, age, level of education, academic title, and teaching experience) and their stage in the innovation-decision process were analyzed and described by calculated mean, standard deviation and analysis of variance by level of response, and computing the degrees of freedom.

The variables faculty members' selected personal characteristics (gender and distance education experience) and their stage in the innovation-decision process were analyzed and described by calculated mean, standard deviation and *t*-test by level of response, and computing the degrees of freedom.

For objective six, the variables faculty members' selected personal characteristics (professional area, age, level of education, academic title, and teaching experience) and their perceptions about attributes of WBDE were analyzed and described by calculated mean, standard deviation and analysis of variance by level of response, and computing the degrees of freedom.

The variables faculty members' selected personal characteristics (gender and distance education experience) and their perceptions about attributes of WBDE were analyzed and described by calculated mean, standard deviation and *t*-test by level of response, and computing the degrees of freedom.

For objective seven, the variables faculty members' selected personal characteristics (professional area, age, level of education, academic title, and teaching experience) and their perceptions about barriers to diffusion of WBDE were analyzed and described by calculated mean, standard deviation and analysis of variance by level of response, and computing the degrees of freedom.

The variables faculty members' selected personal characteristics (gender and distance education experience) and their perceptions about barriers to diffusion of WBDE were analyzed and described by calculated mean, standard deviation and *t*-test by level of response, and computing the degrees of freedom.

For objective eight, the variables faculty members' stage in the innovation-decision process and their perceptions about attributes of WBDE were analyzed and described by calculated mean, standard deviation and analysis of variance by level of response, and computing the degrees of freedom.

For objective nine, the variables faculty members' stage in the innovation-decision process and their perceptions about barriers to diffusion of Web-based distance were analyzed and described by calculated mean, standard deviation and analysis of variance by level of response, and computing the degrees of freedom.

For objective ten, the variables faculty perceptions about attributes of WBDE and their perceptions about barriers to diffusion of WBDE were measured by correlational analysis and finally indicated by measures of association and statistical significance. Measures of association were indicated by Pearson's Product-Moment coefficient of correlation.

Summary of Key Findings/Conclusions for Each Objective

Objective One: Key Findings

The first objective was to describe faculty by selected personal characteristics. These variables include professional area, gender, age, level of education, academic title, teaching experience, and distance education experience. Participants (*N*=273) from twelve different colleges were randomly selected to participate in the study. Among them, 42 (15.4%) were from the College of Animal Science and Technology; 41 (15.1%) from the College of Resource and Environment; 27 (9.9%) from the College of Humanities and Social Science; 27 (9.9%) from the College of Agronomy and Biotechnology; 23 (8.5%) from the College of Food Science and Nutrition Engineering; 20 (7.4%) from the College of Basic Science and Technology; 18 (8.5%) from the College of Electronic and Electric Engineering; 17 (6.3%) from the College of Water

Conservancy and Civil Engineering, 16 (5.9%) from the College of Biological Science; 16 (5.9%) from the College of Engineering; fourteen (5.1%) from the College of Veterinary Medicine; and 11 (4.0%) from the College of Economics and Management. One participant chose not to respond to this question.

Of the 273 participants, 179 (65.6%) participants were male and 94 (34.4%) were female. The study population (*N*=273) was diverse in age. Twenty-two participants (8.2%) were under 30 years old; 62 (23.1%) were in 30-34 years old range; 67 (25.0%) were in 35-39 years old range; 68 (25.4%) were in 40-44 years old range; 37 (13.8%) were in 45-54 years old range; and 12 (4.5%) were more than 54 years old. The youngest faculty member was 23 years old and the oldest faculty member was 66 years old. The average age of participants was approximately 38 years. Five participants chose not to respond to this question.

Among the 273 participants, one hundred and fifty-two (57.4%) had a doctoral degree; 69 (26%) had a master's degree; and 44 (16.6%) had a bachelor's degree. Eight participants chose not to respond to this question. Of the 273 participants, 138 (50.5%) were associate professors; 72 (26.4%) were professors; and 63 (23.1%) were teaching faculty with other title. When classified by teaching experience, 59 participants (23.0%) had less than 5 years of teaching experience; 58 (22.6%) had between 5-9 years of teaching experience; 49 (19.1%) had between 10-14 years of teaching experience; 41 (16.0%) had between 15-19 years of teaching experience; and 50 (19.5%) had more than 19 years of teaching experience. Sixteen chose not to respond this question.

As to distance education experience, 78 participants (28.7%) indicated they had distance education experience at least in one of the three distance education programs: WBDE program, TV and broadcasting education program, or correspondence education program. The remaining 194 (71.3%) indicated no distance education experience. One participant chose not to respond to this question. Among the 78 participants who had distance education experience, 47 had WBDE experience and their length of experience varied from one to five years; 21 had participated in TV and Broadcasting program and their length of experience varied from one to twenty-three years; and 23 had participated in correspondence education program and their length of experience varied from one to fifteen years.

Objective One: Conclusions

The study population was from twelve colleges at the China Agricultural University and there were more male participants than female participants in the study. The majority of the participants were between 30 and 54 years old. More than half of participants had a doctoral degree. The majority of the faculty members were associate professors or professors.

The majority of participating CAU faculty had more than five years' teaching experience and more than half of the population had ten or above years' teaching experience. As to distance education experience, 29% of the population had distance education experience. Forty-seven out of 273 indicated having WBDE experience and the length of experience varied from one to five years; 21 out of 273 indicated having participating into TV and Broadcasting programs and the length of experience varied from one to twenty-three years; 23 out of 273 showed experience in correspondence education program and the length of experience varied from one to fifteen years.

Objective One: Implications

Miller and Miller (2000) found that not all agricultural curriculum areas are perceived as appropriate for delivery through distance education. Miller and Miller's findings suggested that China Agricultural University's diverse academic offerings would present different levels of appropriateness for Web-based distance delivery. Curriculum in such areas as human and social science and economics and management would be expected to be more appropriate for WBDE than curriculum in areas such as engineering or biological science. Academic expertise of faculty may influence faculty adoption behavior and their perceptions about WBDE.

Because China Agricultural University had a male–dominated faculty, male faculty members' perceptions about WBDE were, perhaps, more influential than female faculty members in the innovation-decision process. According to Rogers' (2003) generalizations about characteristics of adopter categories, earlier adopters are not different from later adopters in age. CAU faculty were diverse in age and faculty with different ages were expected to have no differences in their adoption behaviors and their stage in the innovation-decision process. According to Rogers' (2003) generalizations about characteristics of adopter categories, earlier adopters have more years of formal education than later adopters. The majority of CAU faculty had Master's or doctoral degree and they were more likely to become early adopters of educational innovations than faculty with bachelor degree and people do. According to Rogers' (2003) generalizations about characteristics of adopter categories, earlier adopters have higher social status than later adopters. One quarter of CAU faculty were professors and half of CAU faculty were associate professors, which categorizes them as higher social status and suggests they would be earlier adopters of innovation.

CAU faculty had a lot of teaching experiences in traditional education. As to distance education experience, one quarter of them had distance education experience. Comparatively, more faculty were involved in WBDE programs than in TV and broadcasting programs or correspondence education programs. The findings implicate that development of WBDE in the last five years is faster than development of TV and broadcasting programs or development of correspondence education programs. Following this trend, China Agricultural University would foresee rapid diffusion of WBDE in the coming decades and the development of WBDE may, in turn, make huge influences on faculty perceptions about traditional education and nontraditional education. The findings also indicate that there were three faculty who began WBDE before China Agricultural University officially carried out WBDE programs in 2001. According to Rogers' (2003) adopter categories, they were innovators.

Objective One: Recommendations

Further studies are recommended in these areas: (1) female faculty members' social status at the China Agricultural University as a non-dominant faculty group and their influence in the innovation-decision process related to such educational innovations as WBDE; (2) comparison of faculty perceptions about TV and broadcasting programs, correspondence programs, and WBDE according to the program's strengthen, weakness, motivators, and inhibitors; (3) how experience with TV and Broadcasting programs and correspondence education program impact faculty members' attitude toward WBDE; and (4) why and how the three faculties who had more than three years' WBDE experience tried WBDE before China Agricultural University carried out the program.

Objective Two: Key Findings

The second objective was to describe faculty by their current stage in the innovation-decision process related to WBDE (no knowledge, knowledge, persuasion, decision, implementation, confirmation). When asked about their attitude toward the statement---- limited access to higher education by students is a big problem for Chinese institutions of higher education, 194 faculty (71.9%) agreed with the statement, 48 (17.8%) disagreed with the statement, 28 (10.4%) indicated they were not sure, and three participants chose not to respond to the question.

Participants' attitude toward the problem of limited access to higher education by students in China did not differ by stage in the innovation-decision process, F (2, 264)=2.37, p>0.05. Participants' attitude toward the problem also did not differ by the following perceptions of attributes, barriers, and personal characteristics: relative advantage, F (2, 267)=0.76, p>0.05; compatibility, F (2, 267)=0.02, p>0.05; complexity, F (2, 267)=1.62, p>0.05; trialability, F (2, 265)=1.41, p>0.05; observability,

F (2, 267)=2.00, p>0.05; concerns about time, F (2, 265)=2.64, p>0.05; concerns about incentives, F (2, 265)=0.93, p>0.05; WBDE program credibility, F (2, 266)=0.15, p>0.05; financial concerns, F (2, 259)=1.22, p>0.05; planning issues, F (2, 265)=0.65, p>0.05; conflict with traditional education, F (2, 267)=2.92, p>0.05; technical expertise, F (2, 266)=0.60, p>0.05; administrative support, F (2, 265)=0.63, p>0.05; infrastructure, F (2,267)=1.60, p>0.05; professional area, F (11,257)=0.82, p>0.05; gender, t (268)=1.46, p>0.05; age, F (5, 259)=2.31, p>0.05; level of education, F (2, 259)=0.23, p>0.05; academic rank, F (2, 267)=2.38, p>0.05; and teaching experience, F (4, 249)=1.91, p>0.05.

Participants' attitude toward the problem differed significantly by their perception about fear of technology as a barrier to WBDE, F (2, 267)=8.42, p<0.05. Faculty who agree with the problem perceived fear of technology as a moderate barrier, while faculty who disagree with the problem perceived fear of technology as weak barrier. Participants' attitude toward the problem differed significantly by distance education experience, t (267)=2.60, p>0.05. Faculty with distance education experience tended to agree with the existence of the problem, while faculty without distance education experience tended to disagree with the problem.

Results about the distributions of participants in the six stages of the innovation-decision process related to WBDE showed that, of the 273 participants, 14.2% had "no knowledge" about WBDE; 30.2% were in the "knowledge" stage; 26.5% were in the "persuasion" stage; 14.6% were in the "decision" stage; 6.3% were in the "implementation" stage; and 8.2% were in "confirmation" stage. Six participants chose not to respond to this question.

Objective Two: Conclusions

The majority of participating CAU faculty agreed that limited access to higher education by students was a big problem for Chinese institutions of higher education and WBDE would be a good solution to the problem. Less than one third of faculty, however, disagreed or felt not sure about the problem. Participants' attitude toward the problem did not differ by (1) their stage in the innovation-decision process; (2) six personal characteristics (professional area, gender, age, level of education, academic rank, and teaching experience); (3) their perceptions about five attributes (relative advantage, compatibility, complexity, trialability, and observability); and (4) their perceptions about nine barriers (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, technical expertise, administrative support, infrastructure). However, participants' attitude toward the problem differed significantly by their perceptions about one barrier (fear of technology) and by one personal characteristic (their distance education experience). Faculty who agree with the problem perceived fear of technology as a moderate barrier, while faculty who disagree with the problem perceived fear of technology as weak barrier. Faculty with distance education experience tended to agree with the existence of the problem, while faculty without distance education experience tended to disagree with the problem.

In the innovation-decision process related to WBDE, one third of participating CAU faculty were in the “knowledge” stage; one quarter of them were in the “persuasion” stage; and about another one third were in the “decision” stage, “implementation” stage, or “confirmation” stage. A minority of faculty members had no knowledge about WBDE.

Objective Two: Implications

The findings supported Potter’s (2000) conclusion about limited access to education and cost of education as problems facing Chinese education. CAU faculty members’ felt problem about limited access to higher education by students is a good prior condition for faculty’s adoption of WBDE. According to Rogers’ (2003) model of innovation-decision process, felt needs/problems are important prior conditions for potential adopters’ adoption behavior. The stronger one feels the existence of the problem, the more likely he/she would go to seek information/knowledge related to innovation that could solve the felt problem.

The findings showed that WBDE was perceived by the majority of CAU faculty as possible key to the limited access problem. Whether or not it would finally become a good solution, however, would depend on many other factors besides felt needs/problem. Rogers (2003) summarized these factors into several categories: (1) prior conditions (previous practices, innovativeness, norms of the social systems); (2) characteristics of the decision-making unit (socioeconomic characteristics, personality variables, communication); (3) perceived attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability); and (4) communication channels.

The findings implicate that the following factors do not have to be taken into account when considering faculty members' attitude toward problem of limited access to higher education by students: (1) faculty members' stage in the innovation-decision process; (2) six personal characteristics (professional area, gender, age, level of education, academic rank, and teaching experience); (3) faculty perceptions about the five attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability); and (4) faculty perceptions about nine barriers (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, technical expertise, administrative support, and infrastructure).

Faculty perceptions about fear of technology as a barrier to diffusion of WBDE and faculty members' distance education experience, however, need to be taken into account when considering faculty members' attitude toward limited access problem. The study implicates that having distance education experience would influence faculty attitude toward limited access to higher education by students as a problem in China. Faculty with distance education experience were more likely to agree with the existence of limited access problem in Chinese higher education system than faculty without distance education experience. The findings suggest that teaching at distance influences faculty perceptions about the access to higher education problem.

Results about faculty members' stage in the innovation-decision process related to WBDE indicate that, the majority of CAU faculty were in the early stages in the innovation-decision process (no knowledge, knowledge, or persuasion) and a minority of CAU faculty were in the later stages of innovation-decision process (decision, implementation, or confirmation) during the time the study was carried out at the end of 2003. The study modified Rogers' (2003) model of five stages in the innovation-decision process by adding "no knowledge" stage at the beginning of the process. The modified model expanded the innovation-decision process by recognizing the stage when potential adopters had no knowledge about the innovation at the very beginning of their adoption behavior. Findings of the study implicate that China Agricultural University was in the early stages in the innovation-decision process related to WBDE and this finding is accordant with the fact that WBDE, which started in 2001, is a new innovation at the Chinese Agricultural University.

According to Rogers' (2003) model of innovation-decision process, characteristics of the decision-making unit (socioeconomic characteristics, personality variables, and communication behavior) are important when potential adopters are in the "knowledge" stage, while perceived characteristics of the innovations (relative advantage, compatibility, complexity, trialability, and observability) would be influential for potential adopters in the "persuasion" stage. The findings and Rogers' model of innovation-decision process implicate that faculty members' personal characteristics and their perceptions about attributes of WBDE would be very crucial for CAU faculty in their early stages in the innovation-decision process.

Objective Two: Recommendations

Although the majority of CAU faculty agreed with the existence of the limited access problem in Chinese higher education system, there were still a minority of faculty who disagreed or indicated they were not sure of the problem. More studies need to be conducted to find out why these participants would disagree or not feel sure about the problem. Additional studies are recommended in these areas (1) innovativeness and norms of the social systems as other two prior conditions (Rogers, 2003) that would influence faculty members' stage in the innovation-decision process at the China Agricultural University; (2) longitudinal studies on CAU faculty members' stage in the innovation-decision process after a certain period of time (such as five years, ten years, or twenty years) to see the trend of the change.

Objective Three: Key Findings

The third objective was to describe faculty perceptions about attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability). The perceived relative advantage of WBDE was measured by participants' responses to four statements. Frequencies and percentages are used to describe the results. Approximately 84% of participants agreed or strongly agreed that a more flexible time schedule could be followed by using WBDE. Over 70% of participants agreed or strongly agreed that using WBDE could give access to more teaching resources. About 60% of participants agreed or strongly agreed that WBDE could be provided economically and about 32% of participants chose a neutral attitude toward this statement. About 62% of participants agreed or strongly agreed that using WBDE could reach more students. Overall, the mean and standard deviation for perceived relative advantage of WBDE were *M*=3.84 and *SD*=0.63. Faculty at the China Agricultural University tended to agree with the existence of relative advantage of WBDE.

The perceived compatibility of WBDE was measured by participants' responses to four statements. Frequencies and percentages are used to describe the results. About 231 (84.6%) agreed or strongly agreed that WBDE technologies were available to me. Approximately 85% of participants agreed or strongly agreed that using WBDE technologies were acceptable to them. Seventy-eight percent of participants agreed or strongly agreed that procedures used in WBDE would fit well with their teaching conditions. About 61% of participants agreed or strongly agreed that WBDE technologies were available to students and about 29% of participants kept a neutral attitude toward the statement. Overall, the mean and standard deviation for perceived compatibility of WBDE were *M*=3.91 and *SD*=0.57. Faculty at the China Agricultural University tended to agree with the existence of compatibility of WBDE.

The perceived complexity of WBDE was measured by participants' responses to four statements. Frequencies and percentages are used to describe the results. About 85% of participants agreed or strongly agreed that WBDE technologies were readily available to faculty. About 72% of participants agreed or strongly agreed that WBDE technologies were easy to use. About 75% of participants agreed or strongly agreed that the changes in teaching methodology necessary to use WBDE were easy to understand. Approximately 60% of participants agreed or strongly agreed that the changes in teaching methodology necessary to use WBDE would be easy for them to implement and about 28% of participants kept neutral attitude toward the statement. Overall, the mean and standard deviation for perceived complexity of WBDE were M=3.77 and SD=0.62. Faculty at the China Agricultural University tended to agree with the existence of complexity of WBDE.

The perceived trialability of WBDE was measured by participants' response to four statements. Frequencies and percentages are used to describe the results. About 89% of participants agreed or strongly agreed that it was possible for them currently to accomplish some teaching functions (e.g., reporting grades, communication with students) on the Web. Eighty-five percent of participants agreed or strongly agreed that it was possible for them currently to put selected teaching materials (e.g., readings, assignments) on the Web in support of their classes. About 77% of participants agreed or strongly agreed that it was possible for students to use WBDE tools (e.g., Accessing Internet, downloading and uploading materials, watching video lessons, chat on-line, etc.). Seventy-four percent of participants agreed or strongly agreed that it was possible for them to deliver selected portions of a course (a single lesson or unit) by using WBDE prior to developing an entire course. Overall, the mean and standard deviation for perceived trialability of WBDE were M=4.02 and SD=0.60. Faculty at the China Agricultural University tended to agree with the existence of trialability of WBDE.

The perceived observability of WBDE was measured by participants' responses to four statements. Frequencies and percentages are used to describe the results. About 86% of participants agreed or strongly agreed that they knew of some faculty members who are using WBDE. About 80% of participants agreed or strongly agreed that they had observed some WBDE courses on their campus. About 80% of participants agreed or strongly agreed that they were aware of the benefits of WBDE for students. About 76% of participants agreed or strongly agreed that they were aware of the limitations of WBDE for students. Overall, the mean and standard deviation for perceived observability of WBDE were M=4.01 and SD=0.54. Faculty at the China Agricultural University tended to agree with the existence of observability of WBDE.

Objective Three: Conclusions

As to perceived relative advantage of WBDE, the study found that the majority of participating CAU faculty generally agreed with the existence of perceived relative advantage of WBDE. A majority of them agreed or strongly agreed with such relative advantages as having flexible time schedule and accessing more teaching resources. Although more than 50% of participants agreed or strongly agreed with the following statements, "Web-based distance education could be provided economically" and "Web-based distance education could reach more students," 40% of participants had a neutral attitude toward or disagreed with them.

As to perceived compatibility of WBDE, the study found that the majority of participating CAU faculty agreed or strongly agreed that "Web-based distance education technology are available to them," "using Web-based distance education technologies are acceptable to them," and "procedures used in Web-based distance education would fit well with my teaching conditions." Although more than 50% of the participants agreed or strongly agreed with the following statements, "Web-based distance education technologies are available to students," about 30% kept a neutral attitude toward or disagreed with them.

As to perceived complexity of WBDE, the study found that the majority of participating CAU faculty agreed or strongly agreed the statements "Web-based distance education technologies are readily available to faculty," "Web-based distance education technologies are easy to use," and "changes in teaching methodology necessary to use Web-based distance education are easy to understand." Although more than 50% of participants agreed or strongly agreed with the following statements, "changes in teaching methodology necessary to use Web-based distance education will be easy for faculty to implement," 40% of participants had a neutral attitude toward or disagreed with them.

Data showed the majority of participating CAU faculty agreed or strongly agreed with all of the four statements related to perceived trialability of WBDE. Data, further, showed the majority of participating CAU faculty agreed or strongly agreed with all of the four statements related to perceived observability of WBDE.

Objective Three: Implications

Rogers' (2003) concluded that the perceived relative advantage of an innovation by members of a social system is positively related to its rate of adoption. Literature showed that WBDE has such advantages as: (1) ability to reach new audiences; (2) using existing infrastructure for course delivery; (3) flexibility of online education; (4)

institutional cost savings and time savings over traditional place-based education; and etc. (Hopey & Ginsburg, 1996; Kilian, 1997; Murphrey & Dooley, 2000; Owston, 1997). The majority of CAU faculty agreed with the existence of flexibility and accessibility to more teaching resources by faculty in WBDE. The findings implicate that flexibility and accessibility to more teaching resources as perceived advantages of WBDE, which were found by American faculty, also exist in the Chinese Agricultural University.

As to the other two advantages --- ability to reach new audiences and economy of WBDE, a large percentage of CAU faculty had doubts about them. Potter (2003) mentioned an important barrier for the development of distance education in China was the cost of education. Fan (2001) also noted that owning Internet-ready computer and accessing Internet was still expensive in China, especially for students. The findings confirmed the cost problem in the Chinese higher education system, as mentioned by Potter (2003) and Fan (2001). Decreasing the cost of higher education for students as well as the cost of using information technologies for both faculty and students would increase the advantage of WBDE.

Rogers' (2003) concluded that the perceived compatibility of an innovation by members of a social system is positively related to its rate of adoption. The study described the compatibility of WBDE from four perspectives. Findings of the study show that the availability of WBDE technologies and the compatibility of WBDE with current teaching conditions were not problems for CAU faculty. The findings show that the WBDE technologies were ready for CAU faculty and the majority of faculty felt comfortable with WBDE program. The availability of WBDE technologies, however, was perceived as a problem for students by a large percent of CAU faculty. This supports Potter's (2002), Ding's (2002), and Edwards, Zou, Cragg, and Song's (2000) findings about students' limited access to computers and Internet connections as barriers to WBDE development in China. Students, as another large group of potential adopters of WBDE, need to be consulted and included in the planning process to increase the perceived compatibility of WBDE.

Rogers' (2003) concluded that the perceived complexity of an innovation by members of a social system is positively related to its rate of adoption. Findings of the study show that WBDE technologies were easy for CAU faculty to use and changes in teaching methodology necessary to use WBDE were easy for faculty to understand. The complex part for a large percent of CAU faculty was to implement the changed teaching methodology. The findings confirmed Ding's (2002) conclusion that the major challenge for Chinese Information and Computer Technology (ICT)-based education was that faculty were not ready and trainings were needed for instructional design for ICT - based instruction and learning. Helping CAU faculty adjust changes needed for online teaching is important to decrease the perceived complexity of WBDE.

Rogers' (2003) concluded that the perceived trialability of an innovation by members of a social system is positively related to its rate of adoption. Most of CAU faculty agreed with the perceived trialability of WBDE. The findings implicate that most of CAU faculty had chances to try WBDE before fully implementing these kinds of programs. Faculty also perceived students had opportunities to try WBDE.

Rogers' (2003) concluded that the perceived observability of an innovation by members of a social system is positively related to its rate of adoption. Most of CAU faculty had opportunities to observe other people's activities related to WBDE. Faculty members were generally aware of the strength and weakness of WBDE.

Objective Three: Recommendations

Cost of WBDE and availability of WBDE technologies to students were perceived by faculty as two of the major concerns impacting rate of adoption of WBDE. Economic analysis is needed to determine the cost of WBDE and whether it is expensive for both faculty and students to adopt WBDE. Further input/output and benefit analysis are recommended to see whether or not it is worthy for Chinese government to invest in information technologies infrastructure and to decrease the cost of WBDE technologies for potential users. Cooperation is recommended among policy-makers from universities, Chinese Ministry of Education, Chinese Ministry of Information Industry, and Chinese State Planning Commission (SPC) to work on these two problems and to make some favorable policies to decrease cost of WBDE and to increase availability of WBDE technologies to students.

Change in teaching methodology in WBDE was another big concern for CAU faculty. Training programs and practical guidance is needed for CAU faculty to adjust the changes necessary for online teaching. Availability of training programs and in-time guidance would be even more crucial for new or potential distance teachers in coping with the brand-new distance education environment and changes in delivery strategies.

To diffuse WBDE more rapidly, increased opportunities are needed to let more faculty and students to understand WBDE and, if possible, to try Web-based teaching or learning on campus or off campus.

Additional research is needed in these two areas: (1) identification of other relative advantages of WBDE in eyes of CAU faculty; (2) economic analysis about WBDE, especially input/output and benefit analysis of government's investment in WBDE-related infrastructure in educational system, particularly in Chinese vast remote rural areas where traditional higher education is hard to reach but is most needed.

Objective Four: Key Findings

The fourth objective was to describe faculty according to their perceptions about barriers to diffusion of WBDE (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure).

Participants' perceptions about concerns about time as a barrier to diffusion of WBDE were measured by four statements. Results are described by frequencies and percentages. As to "increased faculty time for on-line communication with students," about 56% of participants thought it was a moderate or strong barrier. As to "increased faculty time commitment for course development," almost half of participants (48.4%) thought it was a moderate or strong barrier and about 38% of participants thought it was no or weak barrier. As to "increased faculty time for getting feedback from students," almost half of participants (48.7%) thought it was a moderate or strong barrier and about 43% of participants thought it was no or a weak barrier. As to “increased faculty time to explore more information,” half of participants (50.5%) thought it was not or a weak barrier. Overall, the mean and standard deviation for concerns about time as a perceived barrier to diffusion of WBDE were M=2.84 and SD=1.04. Faculty at the China Agricultural University tended to perceive concerns about time as a moderate barrier to diffusion of WBDE.

Participants’ perceptions about concerns about incentives as a barrier to diffusion of WBDE were measured by participants’ responses to four statements. Results are described by frequencies and percentages. As to “monetary compensation for adopting Web-based distance education,” more than half of participants (51.3%) thought it was a moderate or strong barrier. As to “incentives for adopting Web-based distance education,” about 52% of participants thought it was a moderate or strong barrier and about 40% of participants thought it was no or a weak barrier. As to “awards for adopting Web-based distance education,” almost half of participants (49.1%) thought it was a moderate or strong barrier and about 42% of participants thought it was no or weak barrier. As to “recognition for adopting Web-based distance education,” 52% of participants thought it was a moderate or strong barrier and about 41% of participants thought it was no or a weak barrier. Overall, the mean and standard deviation for concerns about incentives as a perceived barrier to diffusion of WBDE were M=2.75 and SD=0.94. Faculty at the China Agricultural University tended to perceive concerns about incentives as a moderate barrier to diffusion of WBDE.

Participants' perceptions about WBDE program credibility as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Results are described by frequencies and percentages. As to "concerns about evaluation of students' work," about 56% of participants thought it was a moderate or strong barrier. As to "concerns about testing of students' work," about 58% of participants thought it was a moderate or strong barrier. As to "concern that Web-based distance education programs lower the quality of students who are admitted," about half of participants (50.1%) thought it was a moderate or strong barrier. As to "concern that Web-based distance education programs lower the expectations for student learning," almost half of participants (48.7%) thought it was a moderate or strong barrier and about 37% of participants thought it was no or a weak barrier. Overall, the mean and standard deviation for WBDE program credibility as a perceived barrier to diffusion of WBDE were M=3.14 and SD=1.02. Faculty at the China Agricultural University tended to perceive WBDE program credibility as a moderate barrier to diffusion of WBDE.

Participants' perceptions about financial concerns as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Results are described by frequencies and percentages. As to "lack of money to implement Web-based distance education programs," about 56% of participants thought it was a moderate or strong barrier and about 21% of participants thought it was a very strong barrier. As to "increased payment for cost of technologies," about 57% of participants thought it was a weak or moderate barrier and 20% of participants thought it was a strong barrier. As to "sharing revenue with department or business units," about 59% of participants thought it was a moderate or strong barrier. As to “increased tuition and fee rates,” about 57% of participants thought it was a weak or moderate barrier and about a quarter of participants (26.4%) thought it was no barrier. Overall, the mean and standard deviation for financial concerns as a perceived barrier to diffusion of WBDE were M=2.87 and SD=0.88. Faculty at the China Agricultural University tended to perceive financial concerns as a moderate barrier to diffusion of WBDE.

Participants’ perceptions about planning issues as a barrier to diffusion of WBDE were measured by participants’ responses to four statements. Results are described by frequencies and percentages. As to “lack of strategic planning for Web-based distance education,” about 60% of participants thought it was a moderate or strong barrier. As to “lack of a champion for Web-based distance education in the departments within the university,” 60% of participants thought it was a moderate or strong barrier. As to “lack of shared vision for the role of Web-based distance education in the organization,” about 54% of participants thought it was a moderate or strong barrier. As to “lack of identified need (perceived or real) for Web-based distance education,” about 55% of participants thought it was a weak or moderate barrier and about a quarter of participants thought it was no barrier. Overall, the mean and standard deviation for planning issues as a perceived barrier to diffusion of WBDE were M=2.90 and SD=0.95. Faculty at the China Agricultural University tended to perceive planning issues as a moderate barrier to diffusion of WBDE.

Participants’ perceptions about fear of technology as a barrier to diffusion of WBDE were measured by participants’ responses to four statements. Results are described by frequencies and percentages. As to "increased isolation of instructors," about 46% of participants thought it was a strong or very strong barrier and 41% of participants thought it was a weak or moderate barrier. As to "concern for legal issues (e.g., computer crime, hackers, software piracy, copyright)," about half of participants thought it was a weak or moderate barrier. As to "threat to instructors' sense of competence and authority," about 69% of participants thought it was no or a weak barrier. As to "belief that job security is threatened," about 69% of participants thought it was no or a weak barrier. Overall, the mean and standard deviation for fear of technology as a perceived barrier to diffusion of WBDE were M=2.57 and SD=0.93. Faculty at the China Agricultural University tended to perceive fear of technology as a moderate barrier to diffusion of WBDE.

Participants' perceptions about conflict with traditional education as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Results are described by frequencies and percentages. As to "lack of person-to-person contact (i.e., lack of face-to-face interaction with students; difficulty building rapport with participants at a distance)," about 53% of participants thought it was a strong or very strong barrier. As to "disruption of the classroom's traditional social organization," about 58% of participants thought it was no or a weak barrier. As to "traditional academic calendar/schedule hinders Web-based distance education," about 56% of participants thought it was no or a weak barrier. As to "competition with on-campus offerings or competition for existing students," about 64% of participants thought it was no or a weak barrier. Overall, the mean and standard deviation for conflict with traditional education as a perceived barrier to diffusion of WBDE were *M*=2.58 and *SD*=0.91. Faculty at the China Agricultural University tended to perceive conflict with traditional education as a moderate barrier to diffusion of WBDE.

Participants' perceptions about technical expertise as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Results are described by frequencies and percentages. As to "lack of training programs for Web-based distance education," about 61% of participants thought it was a moderate or strong barrier. As to "lack of the 'right' people to implement web-based distance education," about 55% of participants thought it was a moderate or strong barrier. As to "lack of knowledge about Web-based distance education," about 59% of participants thought it was a weak or moderate barrier. As to "lack of technical support," almost half of participants (48.5%) thought it was a weak or moderate barrier and less than one quarter of participants (22.1%) thought it was no barrier. Overall, the mean and standard deviation for technical expertise as a perceived barrier to diffusion of WBDE were *M*=2.88 and *SD*=0.99. Faculty at the China Agricultural University tended to perceive technical expertise as a moderate barrier to diffusion of WBDE.

Participants' perceptions about administrative support as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Results are described by frequencies and percentages. As to "copyright/fair use issues in using materials in Web-based distance education," 55% of participants thought it was a moderate or strong barrier and about one quarter of participants (26.9%) thought it was a very strong barrier. As to "lack of support or encouragement from administrators," about

56% of participants thought it was a moderate or strong barrier. As to "difficulty in recruiting faculty," about 61% of participants thought it was a weak or moderate barrier. As to "difficulty in recruiting students," about 60% of participants thought it was a weak or moderate barrier and about 20% of participants thought it was no barrier. Overall, the mean and standard deviation for administrative support as a perceived barrier to diffusion of WBDE were M=2.94 and SD=0.84. China Agricultural University Faculty tended to perceive administrative support as a moderate barrier to diffusion of WBDE.

Participants' perceptions about infrastructure as a barrier to diffusion of WBDE were measured by participants' responses to four statements. Results are described by frequencies and percentages. As to "lack of adequate student access to computer and Internet," about 50% of participants thought it was a moderate or strong barrier and about 21% of participants thought it was a weak barrier. As to "lack of adequate technology-enhanced classrooms/labs/infrastructure," about 53% of participants thought it was a moderate or strong barrier. As to "lack of library access or delivery of materials and services," about half of participants (48.7%) thought it was a weak or moderate barrier and about 20% of participants thought it was no barrier. As to "lack of adequate instructor access to computer and Internet," 70% of participants thought it was no or a weak barrier. Overall, the mean and standard deviation for infrastructure as a perceived barrier to diffusion of WBDE were M=2.70 and SD=0.96. Faculty at the China Agricultural University tended to perceive infrastructure as a moderate barrier to diffusion of WBDE.

Objective Four: Conclusions

All of the listed ten barriers to diffusion of WBDE were perceived as moderate barriers by faculty at the China Agricultural University. WBDE program credibility was perceived as the biggest barrier among the ten barriers. Concerns about incentives, infrastructure, conflict with traditional education, and fear of technology were seen as the least barriers among the ten barriers. Administrative support, planning issues, technical expertise, financial concerns, and concerns about time were in the middle.

Objective Four: Implications

The findings implicate that the majority of CAU faculty agreed with the existence of the ten barriers identified by American researchers that would impact diffusion of WBDE (e.g., Betts, 1998; Berge, 1999; Clark, 1993; Ding, 1999; Edwards, Zou, Cragg, & Song, 2000; Fan, 2001; Johnson & DeSpain, 2001; Miller & Shih, 1999; Murphy, 1997; Olcott & Wright, 1995; Potter, 2002; Wolcott, 1997). All of the ten items (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure) were perceived as moderate barriers to diffusion of WBDE.

WBDE program credibility was perceived by CAU faculty as the biggest concern. The finding is similar with Born and Miller's (1999) conclusion, which stated that faculty members' greatest concerns about WBDE were the effectiveness of student/professor interactions and the overall quality of a Web-based degree. Much research in America has shown that there is no significant difference in learning outcomes from traditional education and from WBDE program (Lockee, Burton, & Cross, 1999; Navarro & Shoemaker, 2000; Russell, 1999). Rare research, however, has been conducted in China to indicate outcomes of WBDE and to show differences between traditional education and WBDE program.

Administrative support was perceived by CAU faculty as the second biggest barrier to diffusion of WBDE. This finding supports Moore's (1994) contention that the main barrier impeding diffusion of distance education was not technological, nor pedagogical, but organizational and cultural. The major problems were associated with organizational change, change of the role of faculty, and change in administrative structure (Moore, 1994). Most CAU faculty felt copyright/fair use issues in using materials in WBDE was a moderate, strong or very strong barrier. This result supports Edwards and Minich's (1998), and Johnson & DeSpain's (2001) findings, which also concluded that faculty concerned about intellectual property of online courses. This study also found lack of support or encouragement from administrators and difficulties in recruiting faculty and students might be a moderate barrier.

Planning issues were perceived by CAU faculty as the third biggest barrier to diffusion of WBDE. The finding implicates that lack of identified needs, shared vision, and strategic planning for WBDE were looked as challenges to diffusion of WBDE at the China Agricultural University. Rogers (2003) identified that felt needs and innovativeness were crucial prior conditions for one's innovation adoption behavior. China Agricultural University needs a shared vision about university development and efforts are also needed to investigate whether or not WBDE could be a strategy for the university's future development. Leadership and policy-makers' vision would be important for planning strategy, however, faculty members also need to be encouraged to plan WBDE in his/her own vision.

Technical expertise was perceived by CAU faculty as the fourth biggest barrier to diffusion of WBDE. The majority of CAU faculty found that lack of knowledge, lack of training programs, and lack of 'right' person to implement were problems for them. The findings are similar to the results of several previous studies (Dooley & Murphy, 2001; Kotrlik, Redmann, Harrison, & Harndley, 2000; Murphy, 1998). This finding supported Potter's (2003) and Ding's (2002) viewpoint about lack of technical support and lack specific trainings related to WBDE as barriers to WBDE in China.

Financial concerns were perceived by CAU faculty as the fifth biggest barrier to diffusion of WBDE. This finding is similar with several previous studies (Ding, 2002; Edwards, Zou, Cragg, & Song, 2000; Potter, 2003). Potter (2003) pointed out that cost of education, lack of infrastructure, inadequate bandwidth, inadequate access to computers, and inadequate software were challenges facing China's WBDE development. Edwards, Zou, Cragg, and Song (2000) and Ding (2002) also found limited financial support was a problem in Chinese distance education. The findings implicate that economic analysis are needed to study why financial concerns are a problem and what are the benefits for investment of WBDE by University or by the Ministry of Education or the Ministry of Agriculture. Policy-makers in university as well as in the Ministry of Education and the Ministry of Agriculture need to be informed about the outcomes of such economic analysis to make sure whether or not development strategy and allocation of financial resources are worthy for WBDE development in China.

Concerns about time were perceived by CAU faculty as the sixth biggest barrier to diffusion of WBDE. More time is needed for CAU faculty to develop online course and to communicate with distance students. Murphy (1998) recommended that adjustment of workload for faculty involved in WBDE and recognition of faculty members' additional time and efforts in WBDE would decrease faculty members' concerns about time. Findings of the study implicate that workload adjustment and recognition of extra time and effort are also needed for potential adopters of WBDE at the China Agricultural University.

Concerns about incentives were perceived by CAU faculty as the seventh biggest barrier to diffusion of WBDE. Rogers (2003) mentioned that providing incentives would increase the relative advantage of an innovation. Findings of the study implicate that lack of enough incentives (monetary compensation, awards, recognition, and etc.) was perceived as a moderate barrier to diffusion of WBDE. The outcomes are similar to Edwards and Minich's (1998), National Education Association's (2000), and Johnson and DeSpain's (2001) findings. The findings also confirm Ding's (2000) conclusion about unfavorable policies from governments and institutions in rewarding and promoting as a barrier to adopt ICT education. To propel WBDE development, China Agricultural University needs to utilize some favorable incentives to increase the relative advantage of WBDE and to attract faculty to try it.

Infrastructure was perceived by CAU faculty as the eighth biggest barrier to diffusion of WBDE. The finding supports Potter (2003) and Ding's (2002) conclusion about insufficient infrastructure as challenges to WBDE development in China. This finding also verifies Moore's (1994) viewpoint that the main barrier impeding diffusion of distance education were not technological, but organizational and cultural. The finding implicates that technology and infrastructures are important for diffusion of WBDE, but they are not the major barrier. This viewpoint is true in developed countries like America as well as in developing countries like China.

CAU faculty perceived conflict with tradition education as the second least moderate barriers to diffusion of WBDE. However, lack of person-to-person interaction was perceived by the majority of CAU faculty as a strong or very strong barrier. The findings confirm conclusions made by a lot of previous studies about changed interaction and communication manner as big concerns in WBDE (Hillman, Willis, & Gunawardena, 1994; Moore, 1989; Zhang & Fulford, 1994). CAU faculty, however, did not think disruption of the classroom's traditional social organization, traditional academic schedule hindering WBDE, and competition with on-campus offerings or competition for existing students as barriers to diffusion of WBDE.

CAU faculty perceived fear of technology as the least moderate barrier to diffusion of WBDE. The majority of CAU faculty did not perceive WBDE would be a threat to instructors' sense of competence and authority or their job security. The majority of them, however, expressed concern about increased isolation brought by technology and legal issues related to WBDE. The Boyer Commission (1998) commented that technology would alter the manner of teaching and it was the role of universities to make technology positively. The finding implicates that fear of technology, especially the increased isolation brought by technology and legal issues need to be taken into account when considering diffusion of WBDE in Chinese Agricultural University.

Objective Four: Recommendations

Further research is recommended to study effectiveness of WBDE in China and comparison between quality of traditional education and that of WBDE. Publications of the outcomes of the effectiveness are also recommended to let faculty from different major areas be aware of the effectiveness of WBDE.

Betts (1998) and Schifter (2000, 2002) found that intrinsic factors (such as intellectual challenges or personal motivation to use technology) had greater influence on faculty participation in distance education than extrinsic factors (such as recognition or reward). The study has not yet explored the different influences intrinsic and extrinsic factors may have on faculty adoption behavior and so further study is recommended about faculty perceptions about intrinsic motivations and extrinsic motivations.

As to infrastructure concerns, although lack of infrastructure was mentioned frequently as a barrier to WBDE development in developing countries like China, CAU faculty perceived it as a less moderate barrier than administrative support or planning issues. More studies are recommended about function of organization and culture and their role in diffusion of WBDE. At the same time, economic analysis, especially input/output analysis and benefit analysis, are needed to study the rationale of investment in WBDE by university, the Ministry of Education, or the Ministry of Agriculture. It is recommended that policy-makers from university, the Ministry of Education, the Ministry of Agriculture be informed about the outcomes of these studies for better decision-making.

Adjustment of workload and recognition of extra time and effort for WBDE participants are needed to decrease CAU faculty concerns about time in WBDE. Training programs for faculty related to using distance technologies and efficient Web-based instructional design are recommended to increase faculty members' technical expertise and to decrease their fear of technology. Research on why and how these concerns are bothering CAU faculty and whether or not other barriers that have not been mentioned in the study exist in their practice is strongly recommended.

Objective Five: Key Findings

The fifth objective was to examine the relationship between faculty members' selected personal characteristics and their stage in the innovation-decision process. Faculty members' stage in the innovation-decision process differed significantly by professional area, F (11, 255)=2.63, p<0.05. A medium effect size (f=0.34) was found. Overall, China Agricultural University faculty (M= 2.93, SD=1.42) tended to be in the stage of "persuasion." Faculty from the College of Humanities and Social Science (M=3.88, SD=1.54) tended to be in the stage of "decision," while faculty from the College of Electronic and Electric Engineering (M=3.47, SD=1.59), College of Food

Science and Nutrition Engineering (*M*=3.09, *SD*=1.31), College of Engineering (*M*=3.06, *SD*= 1.69), College of Economics and Management (M=3.00, SD=1.63), College of Veterinary Medicine (*M*=3.00, *SD*=1.36), College of Agronomy and Biotechnology (*M*=3.00, *SD*=1.44), College of Animal Science and Technology (*M*=2.88, *SD*=1.29), College of Basic Science and Technology (*M*=2.70, *SD*=1.08), and College of Resource and Environment (*M*=2.68, *SD*= 1.47) tended to be in the "persuasion" stage. Faculty from the College of Water Conservancy and Civil Engineering (*M*=2.24, *SD*=0.90) and College of Biological Science (*M*=2.00, *SD*= 0.82) tended to be in the "knowledge" stage.

Faculty members' stage in the innovation process differed significantly by level of education, F (2, 257)=5.05, p<0.05. Faculty with Bachelor's degree tended to be in later stage in the innovation-decision process than faculty with Master's degree. Faculty with Master's degree tended to be in later stage in the innovation –decision process than faculty with doctoral degree. A small effect size (f=0.20) was found.

Faculty members' stage in the innovation-decision process differed significantly by teaching experience, F (4, 247)=3.93, p<0.05. Faculty with more years' teaching experience tended to be in later stage in the innovation-decision process than faculty with less years' teaching experience. However, faculty with about 15-19 years' teaching experience tended to be in later stage in the innovation-decision process than faculty with more than 19 years' teaching experience. A medium effect size (f=0.25) was found.

Faculty members' stage in the innovation-decision process differed significantly by distance education experience, t (265)=7.04, p<0.05, Faculty with distance education experience tended to be in later stage in the innovation-decision process than did faculty without distance education experience. A large effect size (f=0.86) was found.

Faculty members' stage in the innovation-decision process did not differ by gender, t (266)=0.97, p>0.05. A small effect size (d=0.11) was found. Faculty members' stage in the innovation-decision process did not differ by age, F (5, 257)=1.73, p>0.05. A small effect size (f=0.18) was found. Faculty members' stage in the innovation-decision process did not differ by academic rank, F (2, 265)=0.12, p>0.05. A negligible effect size (f=0.03) was found.

Objective Five: Conclusions

Gender, age, and academic rank had no significantly influence on faculty members' stage in the innovation-decision process related to WBDE. Faculty members' stage in the innovation-decision process, however, differed significantly by professional area, level of education, teaching experience, and distance education experience.

Faculty from different professional areas differed significantly in their stage of the innovation-decision process. CAU faculty overall were in the "persuasion" stage in the innovation-decision process related to WBDE. Faculty from one department (College of Humanities and Social Science) indicated that they were in the "decision" stage, while faculty from nine colleges (College of Electronic and Electric Engineering, College of Food Science and Nutrition Engineering, College of Engineering, College of Economics and Management, College of Agronomy and Biotechnology, College of Veterinary Medicine, College of Animal Science and Technology, College of Basic Science and

Technology, and College of Resource and Environment) indicated that they were in the "persuasion" stage. Faculty from the rest two colleges (College of Water Conservancy and Civil Engineering and College of Biological Science) showed that they were still in the "knowledge" stage.

Level of education had a negative impact on faculty members' stage in the innovation-decision process. Faculty with bachelor degree averagely stayed in later stage in the innovation-decision process than did faculty with Master's and doctoral degree. Teaching experiences and distance education experiences had positive impact on faculty members' stage in the process. The more teaching experiences faculty had; the later stages they tended to stay in the innovation-decision process. Faculty who had distance education experiences tended to stay in later stage in the innovation-decision process than did faculty who had no distance education experience.

Objective Five: Implications

Rogers (2003) concluded that one's socioeconomic status and previous practice would influence their stage in the innovation-decision process. He generalized that the relatively earlier adopters in a social system are no different from later adopters in age, but they have more years of formal education, and have higher social status, larger-sized units, such as farms, companies, schools, and so on, and greater knowledge of innovations than do later adopters (Rogers, 2003).

This study confirmed Rogers' (2003) generalization that the earlier adopters are not different from later adopters in age. Similar results were found in Schifter's (2000) study, in which age showed no significant impact on the level of faculty participation in distance education program. The findings implicate that age does not need to be taken into account when considering differences in CAU faculty members' stage in the innovation-decision process.

The study agreed with Rogers' (2003) viewpoint about previous practice as an important prior condition to one's innovation-decision process by finding teaching experience and distance education experience has positive impact on faculty members' adoption behavior. The findings implicate that teaching experience and distance education experience need to be taken into account when considering differences in faculty members' stage in the innovation-decision process. The more teaching experience and distance education experience one own, the more possible for him/her to step further in the innovation-decision process.

The study challenges Rogers' (2003) generalizations that the relatively earlier adopters in a social system have more years of formal education and have higher social status by finding that (1) level of education showed a significant negative impact on faculty members' stage in the innovation-decision process; and (2) academic rank did not show significant impact on faculty members' stage in the innovation-decision process. The result related to level of education implicate that Rogers' (2003) generalization about the positive impact of formal education on adopter behavior is not always true. The result related to academic rank is consistent with Schifter's (2000) finding that faculty members' academic rank had no significant effect on the level of faculty participation in distance education program. Both of the two findings implicate that social status do not always have a positive impact on one's adoption behavior.

The study expanded Rogers' (2003) generalization about the characteristics of adopter categories by finding that (1) gender did not show a significant impact on faculty members' stage in the innovation-decision process; and (2) professional area showed significant impact on faculty members' stage in the innovation-decision process. Faculty from social science-related majors is generally more active in adopting WBDE than faculty with background in biological science and engineering. The findings confirmed Miller and Miller's (2000) conclusion that curriculum areas in social science are generally more appropriate for telecommunication network delivery than curriculum areas that require laboratory, workshop, or hands-on activities.

The findings implicate that gender and academic rank do not have to be taken into account when considering faculty members' stage in the innovation-decision process. However, impact of professional area, level of education, teaching experience, and distance education experience need to be taken into account when thinking of faculty members' stage in the innovation-decision process.

Objective Five: Recommendations

More research is needed to study the following problems: (1) why level of education has a negative impact on faculty members' stage in the innovation-decision process; (2) how to design online course for curriculum areas related to engineering or biology; and (3) how to combine online lecture and lab, workshop, or hand-on activities in engineering or biology related majors?

Objective Six: Key Findings

The sixth objective was to examine the relationship between faculty members' selected personal characteristics and their perceptions about attributes of WBDE. Faculty perceptions about relative advantage of WBDE did not differ by professional area, F (11, 260)=0.74, p>0.05. A small effect size (f=0.18) was found. Faculty perceptions about compatibility of WBDE did not differ by professional area, F (11, 260)=1.35, p>0.05. A small effect size (f=0.24) was found. Faculty perceptions about complexity of WBDE did not differ by professional area, F (11, 260)=0.76, p>0.05, A small effect size (f=0.18) was found. Faculty perceptions about trialability of WBDE did not differ by professional area, F (11, 258)=1.64, p>0.05. A medium effect size (f=0.26) was found. Faculty perceptions about observability of WBDE did not differ by professional area, F (11, 260)=1.39, p>0.05. A small effect size (f=0.24) was found.

Faculty perceptions about relative advantage of WBDE did not differ by gender, t (271)=0.65, p>0.05. A negligible effect size (d=0.08) was found. Faculty perceptions about compatibility of WBDE did not differ by gender, t (271)=0.83, p>0.05. A negligible effect size (d=0.11) was found. Faculty perceptions about complexity of WBDE did not differ by gender, t (271)=0.58, p>0.05. A negligible effect size (d=0.06) was found. Faculty perceptions about trialability of WBDE did not differ by gender,

t (269)=0.52, $p>0.05$, A negligible effect size (d=0.07) was found. Faculty perceptions about observability of WBDE did not differ by gender, t (271)=1.50, $p>0.05$, A negligible effect size (d=0.19) was found.

Faculty perceptions about relative advantage of WBDE did not differ by age, F (5, 262)=0.38, $p>0.05$. A negligible effect size (f=0.08) was found. Faculty perceptions about compatibility of WBDE did not differ by age, F (5, 262)=0.87, $p>0.05$. A small effect size (f=0.13) was found. Faculty perceptions about complexity of WBDE did not differ by age, F (5, 262)=1.49, $p>0.05$. A small effect size (f=0.17) was found. Faculty perceptions about trialability of WBDE did not differ by age, F (5, 260)=1.17, $p>0.05$. A small effect size (f=0.15) was found. Faculty perceptions about observability of WBDE did not differ by age, F (5, 262)=0.32, $p>0.05$. A small effect size (f=0.08) was found.

Faculty perceptions about relative advantage of WBDE did not differ by level of education, F (2, 262)=0.48, $p>0.05$. A negligible effect size (f=0.06) was found. Faculty perceptions about compatibility of WBDE did not differ by level of education, F (2, 262)=0.30, $p>0.05$. A negligible effect size (f=0.05) was found. Faculty perceptions about complexity of WBDE did not differ by level of education, F (2, 262)=0.40, $p>0.05$. A negligible effect size (f=0.06) was found. Faculty perceptions about trialability of WBDE did not differ by level of education, F (2, 260)=1.28, $p>0.05$. A small effect size (f=0.10) was found. Faculty perceptions about observability of WBDE did not differ by level of education, F (2, 262)=1.72, $p>0.05$. A small effect size (f=0.11) was found.

Faculty perceptions about relative advantage of WBDE did not differ by academic rank, F (2, 270)=0.46, p>0.05. A negligible effect size (f=0.06) was found. Faculty perceptions about compatibility of WBDE did not differ by academic rank, F (2, 270)=0.57, p>0.05. A negligible effect size (f=0.06) was found. Faculty perceptions about complexity of WBDE did not differ by academic rank, F (2, 270)=0.48, p>0.05. A negligible effect size (f=0.06) was found. Faculty perceptions about trialability of WBDE did not differ by academic rank, F (2, 268)=1.46, p>0.05. A small effect size (f=0.10) was found. Faculty perceptions about observability of WBDE did not differ by academic rank, F (2, 270)=1.64, p>0.05. A small effect size (f=0.11) was found.

Faculty perceptions about compatibility of WBDE differed significantly by teaching experience, F (4, 252)=2.65, p<0.05. A small effect size (f=0.21) was found. Faculty with more years' teaching experiences tended to agree with the existence of perceived compatibility of WBDE more than faculty with less years' teaching experience. However, faculty with about 15-19 years' teaching experience tended to agree with the existence of perceived compatibility of WBDE more than faculty with more than 19 years' teaching experience.

Faculty perceptions about relative advantage of WBDE did not differ by teaching experience, F (4, 252)=0.43, p>0.05. A negligible effect size (f=0.08) was found. Faculty perceptions about complexity of WBDE did not differ by teaching experience, F (4, 252)=1.11, p>0.05. A small effect size (f=0.13) was found. Faculty perceptions about trialability of WBDE did not differ by teaching experience, F (4, 250)=1.38, p>0.05. A small effect size (*f*=0.15) was found. Faculty perceptions about observability of WBDE did not differ by teaching experience, F (4, 252)=1.17, $p>0.05$. A small effect size (*f*=0.14) was found.

Faculty perceptions about compatibility of WBDE differed significantly by distance education experience, t (270)=1.99, $p<0.05$. Faculty with distance education experience tended to agree with the existence of perceived compatibility of WBDE more than faculty without distance education experience. A small effect size (*d*=0.25) was found.

Faculty perceptions about observability of WBDE differed significantly by distance education experience, t (270)=3.56, $p<0.05$. Faculty with distance education experience tended to agree with the existence of perceived observability of WBDE more than faculty without distance education experience. A small effect size (*d*=0.46) was found.

Faculty perceptions about relative advantage of WBDE did not differ by distance education experience, t (270)=0.33, $p>0.05$. A negligible effect size (*d*=0.03) was found. Faculty perceptions about complexity of WBDE did not differ by distance education experience, t (270)=0.63, $p>0.05$. A negligible effect size (*d*=0.08) was found. Faculty perceptions about trialability of WBDE did not differ by distance education experience, t (268)=0.11, $p>0.05$. A negligible effect size (*d*=0.02) was found.

Objective Six: Conclusions

Such personal characteristics as professional area, gender, age, level of education, and academic rank had no significant influence on faculty perceptions about the five attributes of WBDE.

Teaching experience had no significant influence on faculty perceptions about four of the five attributes of WBDE (relative advantage, complexity, trialability, and observability). However, it had significant impact on faculty members' perceived compatibility of WBDE. Faculty with 15-19 years of teaching experience tended to agree with the existing of compatibility of WBDE more than faculty with less than 15 years of teaching experience or faculty with more than 19 years of teaching experience.

Distance education experience had no significant influence on faculty perceptions about three of the five attributes of WBDE (relative advantage, complexity, and trialability). However, it had significant impact on faculty members' perceived compatibility and observability of WBDE. Faculty with distance education experience tended to agree with the existing of compatibility and observability of WBDE more than faculty without distance education experience.

Objective Six: Implications

Professional area, gender, age, level of education, and academic rank do not have to be taken into consideration when considering faculty perceptions about the five attributes of WBDE.

Teaching experience does not have to be taken into consideration when considering faculty members' perceived relative advantage, perceived complexity, perceived trialability, and perceived observability of WBDE. However, it needs to be taken into account when considering faculty members' perceived compatibility of WBDE. The findings implicate that the more teaching experience faculty have, the more they feel WBDE is compatible with their existing values, past experiences, and needs.

Distance education experience does not have to be taken into consideration when considering faculty members' perceived relative advantage, perceived complexity, and perceived trialability of WBDE. However, it needs to be taken into account when considering faculty members' perceived compatibility and perceived observability of WBDE. The findings are partly consistent with Born and Miller's (1999) and Schifter's (2000) conclusion, which stated that faculty members' distance education experience would significantly impact their perceptions about WBDE. The findings implicate that distance education experience has a significantly positive impact on faculty perceptions about compatibility and observability of WBDE. More distance education experience would increase faculty perceptions about compatibility and observability of WBDE.

Objective Six: Recommendations

Further research is recommended to find out (1) why faculty with 15-19 years of teaching experiences tended to agree more with the compatibility of WBDE; (2) why teaching experience would impact significantly faculty perceptions about compatibility of WBDE; and (3) why distance education experience would significantly impact faculty perceptions about compatibility and observability of WBDE.

Objective Seven: Key Findings

Objective seven sought to examine the relationship between faculty members' selected personal characteristics and their perceptions about barriers to diffusion of WBDE. Faculty perceptions about concerns about time as a barrier to diffusion of WBDE differed significantly by professional area, F (11, 258)=1.89, p<0.05. A medium effect size (f=0.28) was found. Faculty from the College of Humanities and Social Science, College of Resource and Environment, College of Economics and Management, College of Animal Science and Technology, College of Water Conservancy and Civil Engineering, College of Engineering, College of Agronomy and Biotechnology, College of Electronic and Electric Engineering, and College of Food Science and Nutrition tended to perceive concerns about time as a moderate barrier to diffusion of WBDE. Faculty from the College of Basic Science and Technology and College of Veterinary Medicine tended to perceive time concerns as a weak barrier to diffusion of WBDE.

Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by professional area, F (11, 258)=1.14, p>0.05. A small effect size (f=0.22) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by professional area, F (11, 258)=1.01, p>0.05. A small effect size (f=0.21) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by professional area, F (11, 252)=0.97, p>0.05. A small effect size (f=0.21) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by professional area, F (11, 258)=1.57, p>0.05. A medium effect size (f=0.26) was found. Faculty perceptions about fear of technology as a perceived barrier to diffusion of WBDE did not differ by professional area, F (11, 260)=0.70, p>0.05. A small effect size (f=0.17) was found. Faculty perceptions about conflict with traditional education as a perceived barrier to diffusion of WBDE did not differ by professional area, F (11, 260)=1.69, p>0.05. A medium effect size (f=0.27) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by professional area, F (11, 259)=1.34, p>0.05. A small effect size (f=0.24) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by professional area, F (11, 258)=1.21, p>0.05. A small effect size (f=0.23) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by professional area, F (11,160)=1.26, p>0.05. A small effect size (f=0.23) was found.

Faculty perceptions about concerns about time as a barrier to diffusion of WBDE differed significantly by gender, t (269)=2.68, p<0.05. A small effect size (d=0.34) was found. Male faculty tended to perceive concerns about time as a moderate barrier to diffusion of WBDE more than female faculty.

Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by gender, t (269)=1.20, p>0.05. A negligible effect size (d=0.15) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by gender, *t* (269)=0.52, *p*>0.05. A negligible effect size (*d*=0.07) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by gender, *t* (263)=0.49, *p*>0.05. A negligible effect size (*d*=0.07) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by gender, *t* (269)=0.08, *p*>0.05. A negligible effect size (*d*=0) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by gender, *t* (271)=0.55, *p*>0.05. A negligible effect size (*d*=0.06) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by gender, *t* (271)=0.21, *p*>0.05. A negligible effect size (*d*=0.02) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by gender, *t* (270)=0.92, *p*>0.05. A negligible effect size (*d*=0.11) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by gender, *t* (269)=0.24, *p*>0.05. A negligible effect size (*d*=0.02) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by gender, *t* (271)=0.81, *p*>0.05. A negligible effect size (*d*=0.10) was found.

Faculty perceptions about concerns about time as a barrier to diffusion of WBDE did not differ by age, *F* (5, 260)=1.05, *p*>0.05. A small effect size (*f*=0.14) was found. Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by age, *F* (5, 260)=0.73, *p*>0.05. A small effect size (*f*=0.12) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by age, *F* (5, 260)=1.28, *p*>0.05. A small effect size (*f*=0.16) was found.

Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by age, F (5, 254)=0.45, p>0.05. A negligible effect size (f=0.09) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by age, F (5, 260)=0.58, p>0.05. A small effect size (f=0.11) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by age, F (5, 262)=0.75, p>0.05. A small effect size (f=0.12) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by age, F (5, 262)=0.74, p>0.05. A small effect size (f=0.12) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by age, F (5, 261)=1.57, p>0.05. A small effect size (f=0.17) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by age, F (5, 260)=0.33, p>0.05. A negligible effect size (f=0.08) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by age, F (5, 262)=0.68, p>0.05. A small effect size (f=0.11) was found.

Faculty perceptions about concerns about time as a barrier to diffusion of WBDE did not differ by level of education, F (2, 260)=0.66, p>0.05. A negligible effect size (f=0.07) was found. Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by level of education, F (2, 260)=0.35, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by level of education, F (2, 260)=2.13, p>0.05. A small effect size (f=0.13) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by level of education, F (2, 255)=1.49, p>0.05. A small effect size (f=0.11) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by level of education, F (2, 261)=0.79, p>0.05. A negligible effect size (f=0.08) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by level of education, F (2, 262)=0.40, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by level of education, F (2, 262)=0.28, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by level of education, F (2, 261)=0.36, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by level of education, F (2, 260)=0.83, p>0.05. A negligible effect size (f=0.08) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by level of education, F (2, 262)=0.30, p>0.05. A negligible effect size (f=0.05) was found.

Faculty perceptions about concerns about time as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 268)=0.20, p>0.05. A negligible effect size (f=0.04) was found. Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 268)=0.35, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 268)=1.22, p>0.05. A small effect size (f=0.10) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 262)=1.68, p>0.05. A small effect size (f=0.11) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 268)=0.46, p>0.05. A negligible effect size (f=0.06) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 270)=2.33, p>0.05. A small effect size (f=0.13) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 270)=0.78, p>0.05. A negligible effect size (f=0.08) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 269)=1.17, p>0.05. A negligible effect size (f=0.09) was found. Faculty perceptions about administrative supports as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 268)=0.63, p>0.05. A negligible effect size (f=0.07) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by academic rank, F (2, 270)=0.04, p>0.05. A negligible effect size (f=0.02) was found.

Faculty perceptions about concerns about time as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 250)=0.96, p>0.05. A small effect size (f=0.12) was found. Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 251)=0.24, p>0.05. A negligible effect size (f=0.06) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of WBDE did not differ by teaching experience, F (4, 250)=0.16, p>0.05. A negligible effect size (f=0.05) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by teaching experience, *F* (4, 244)=0.70, *p*>0.05. A small effect size (*f*=0.11) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by teaching experience, *F* (4, 250)=0.24, *p*>0.05. A negligible effect size (*f*=0.06) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by teaching experience, *F* (4, 252)=0.75, *p*>0.05. A small effect size (*f*=0.11) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by teaching experience, *F* (4, 252)=0.09, *p*>0.05. A negligible effect size (*f*=0.04) was found. Faculty perceptions about technical expertise as a barrier to diffusion of WBDE did not differ by teaching experience, *F* (4, 251)=0.74, *p*>0.05. A small effect size (*f*=0.11) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by teaching experience, *F* (4, 251)=0.66, *p*>0.05. A small effect size (*f*=0.10) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by teaching experience, *F* (4, 252)=0.39, *p*>0.05. A negligible effect size (*f*=0.08) was found.

Faculty perceptions about concerns about time as a barrier to diffusion of WBDE did not differ by distance education experience, *t* (268)=0.88, *p*>0.05. A negligible effect size (d=0.11) was found. Faculty perceptions about concerns about incentives as a barrier to diffusion of WBDE did not differ by distance education experience, *t* (268)=0.16, *p*>0.05. A negligible effect size (*d*=0.02) was found. Faculty perceptions about WBDE program credibility as a barrier to diffusion of Web-based distance did not differ by distance education experience, *t* (268)=0.13, *p*>0.05. A negligible effect size (*d*=0.01) was found. Faculty perceptions about financial concerns as a barrier to diffusion of WBDE did not differ by distance education experience, *t* (263)=1.20, *p*>0.05. A negligible effect size (*d*=0.16) was found. Faculty perceptions about planning issues as a barrier to diffusion of WBDE did not differ by distance education experience, *t* (268)=0.72, *p*>0.05. A negligible effect size (*d*=0.09) was found. Faculty perceptions about fear of technology as a barrier to diffusion of WBDE did not differ by distance education experience, *t* (270)=1.20, *p*>0.05. A negligible effect size (*d*=0.16) was found. Faculty perceptions about conflict with traditional education as a barrier to diffusion of WBDE did not differ by distance education experience, *t* (270)=1.90, *p*>0.05. A small effect size (*d*=0.24) was found. Faculty perceptions about technical expertise as a barrier to diffusion of Web-based distance did not differ by distance education experience, *t* (269)=0.53, *p*>0.05. A negligible effect size (*d*=0.07) was found. Faculty perceptions about administrative support as a barrier to diffusion of WBDE did not differ by distance education experience, *t* (268)=0.34, *p*>0.05. A negligible effect size (*d*=0.05) was found. Faculty perceptions about infrastructure as a barrier to diffusion of WBDE did not differ by distance education experience, *t* (270)=0.39, *p*>0.05. A negligible effect size (*d*=0.05) was found.

Objective Seven: Conclusions

Such factors as age, level of education, academic rank, teaching experience, and distance education experience had no significant influence on faculty perceptions about the ten barriers to diffusion of WBDE (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, fear of technology, conflict with traditional education, technical expertise, administrative support, and infrastructure).

Professional area had no significant influence on faculty perceptions about nine of the ten barriers to diffusion of WBDE (concerns about incentives, WBDE program credibility, financial concerns, planning issues, fear of technology, conflict with traditional education, technical expertise, administrative support, and infrastructure). However, it had significant impact on faculty perceptions about concerns about time as a barrier to diffusion of WBDE. Faculty from the College of Humanities and Social Science, College of Resource and Environment, College of Economics and Management tended to perceive concerns about time as a moderate barrier to diffusion of WBDE. Faculty from the College of Basic Science and Technology and College of Veterinary Medicine tended to look concerns about time as a weak barrier to diffusion of WBDE.

Gender had no significant influence on faculty perceptions about nine of the ten barriers to diffusion of WBDE (concerns about incentives, WBDE program credibility, financial concerns, planning issues, fear of technology, conflict with traditional education, technical expertise, administrative support, and infrastructure). However, it had significant impact on faculty perceptions about concerns about time as a barrier to diffusion of WBDE. Male faculty perceived concerns about time as a moderate barrier to diffusion of WBDE more than did female faculty.

Objective Seven: Implications

Factors such as age, level of education, academic rank, teaching experience, and distance education experience do not have to be taken into consideration when considering faculty perceptions about concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, fear of technology, conflict with traditional education, technical expertise, administrative support, and infrastructure as barriers to diffusion of WBDE. The findings were not consistent with Schifter's (2000) findings, which concluded that faculty members' age, academic rank, distance education experience would significantly influence their perceptions about inhibiting factors for participating in distance education.

Professional area does not have to be taken into consideration when considering faculty perceptions about concerns about incentives, WBDE program credibility, financial concerns, planning issues, fear of technology, conflict with traditional education, technical expertise, administrative support, and infrastructure as barriers to diffusion of WBDE. However, it needs to be taken into account when considering faculty perceptions about concerns about time as a barrier to diffusion of WBDE.

Gender does not have to be taken into consideration when considering faculty perceptions about concerns about incentives, WBDE program credibility, financial concerns, planning issues, fear of technology, conflict with traditional education, technical expertise, administrative support, and infrastructure as barriers to diffusion of WBDE. However, it needs to be taken into account when considering faculty perceptions about concerns about time as a barrier to diffusion of WBDE. The findings is consistent with Schifter's (2000) findings which concluded that gender would significantly influence faculty perceptions about inhibiting factors for participating in distance education.

Objective Seven: Recommendations

Further studies are needed to investigate (1) why age, academic rank, and distance education experience would significantly influence faculty perceptions about inhibiting factors for participating in distance education in Schifter's (2000) study while they did not have significant influence on faculty perceptions about the ten barriers to diffusion of WBDE at the China Agricultural University; (2) why faculty from different professional areas perceive time in WBDE differently; and (3) why male faculty would see time concerns as a more moderate barrier to WBDE.

Objective Eight: Key Findings

The eighth objective was to examine the relationship between faculty members' stage in the innovation-decision process and their perceptions about attributes of WBDE. Faculty perceptions about compatibility of WBDE differed significantly by stage in the innovation-decision process, F (5, 262)=4.02, p<0.05. Faculty who were in later stage in the innovation-decision process tended to agree with the existence of perceived relative advantage of WBDE more than faculty who stayed in the earlier stages. A medium effect size (f=0.28) was found.

Faculty perceptions about complexity of WBDE differed significantly by stage in the innovation-decision process, F (5, 262)=3.09, p<0.05. Faculty who were in later stage in the innovation-decision process tended to agree with the existence of perceived complexity of WBDE more than faculty who stayed in the earlier stages. A small effect size (f=0.24) was found.

Faculty perceptions about trialability of WBDE differed significantly by stage in the innovation-decision process, F (5, 260)=4.92, p<0.05. Faculty who were in later stage in the innovation-decision process tended to agree with the existence of perceived trialability of WBDE more than faculty who stayed in the earlier stages. A medium effect size (f=0.31) was found.

Faculty perceptions about observability of WBDE differed significantly by stage in the innovation-decision process, F (5, 262)=8.69, p<0.05. Faculty who were in later stage in the innovation-decision process tended to agree with the existence of perceived observability of WBDE more than faculty who stayed in the earlier stages. A large effect size (f=0.41) was found.

Faculty perceptions about relative advantage of WBDE did not differ by stage in the innovation-decision process, F (5, 262)=1.68, p>0.05. A small effect size (f=0.18) was found.

Objective Eight: Conclusions

Faculty members' stage in the innovation-decision process related to WBDE had no significant influence on faculty perceptions about relative advantage of WBDE.

However, it had significant impact on faculty perceptions about the other four attributes of the WBDE (compatibility, complexity, trialability, and observability). Faculty who were in later stage in the innovation-decision process tended to agree with the existence of compatibility, complexity, trialability, and observability of WBDE more than faculty who stay in the earlier stages.

Objective Eight: Implications

Faculty members' stage in the innovation-decision process does not have to be taken into account when considering faculty perceptions about relative advantage of WBDE. It needs to be taken into consideration when considering faculty perceptions about compatibility, complexity, trialability, and observability of WBDE. The findings implicate that faculty in different stages in the innovation-decision process have similar perceptions about relative advantage of WBDE, while they have significantly different perceptions about (1) whether or not WBDE is consistent with the existing values, past experiences, or needs of faculty; (2) whether or not it is difficult to understand and use WBDE; (3) whether or not WBDE could be experimented on a limited basis; and (4) whether or not the results of WBDE are visible to others.

Objective Eight: Recommendations

The later stage faculty are located in the innovation-decision process, the more they would agree with the perceive attributes of WBDE. More WBDE related programs or activities might help faculty move forward in the innovation-decision process and help them have better understanding about attributes of WBDE.

Objective Nine: Key Findings

The ninth objective was to examine the relationship between faculty members' stage in the innovation-decision process and their perceptions about barriers to diffusion of WBDE. Faculty perceptions about WBDE program credibility as a perceived barrier to diffusion of WBDE differed significantly by stage in the innovation-decision process, F (5, 261)=3.18, p<0.05. Faculty who were in the stages of "confirmation" or "implementation" tended to perceive WBDE program credibility as a moderate barrier to diffusion of WBDE more than faculty who were in the stages of "no knowledge" or "knowledge." However, faculty who were in the stages of "no knowledge" or "knowledge" tended to perceive WBDE program credibility as a moderate barrier to diffusion of WBDE more than faculty who were in the stages of "persuasion" or "decision." A medium effect size (f=0.25) was found.

Faculty perceptions about concerns about time as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5, 260)=0.81, p>0.05. A small effect size (f=0.12) was found. Faculty perceptions about concerns about incentives to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5, 260)=0.96, p>0.05. A small effect size (f=0.14) was found. Faculty perceptions about financial concerns as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5, 254)=0.81, p>0.05. A small effect size (f=0.13) was found. Faculty perceptions about planning issues as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5, 260)=0.45, p>0.05. A negligible effect size (f=0.09) was found. Faculty perceptions about fear of technology as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5, 262)=0.82, p>0.05. A small effect size (f=0.13) was found. Faculty perceptions about conflict with traditional education as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5, 262)=0.40, p>0.05. A negligible effect size (f=0.09) was found. Faculty perceptions about technical expertise as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5, 261)=0.77, p>0.05. A small effect size (f=0.12) was found. Faculty perceptions about administrative support as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5, 260)=0.76, p>0.05. A small effect size (f=0.12) was found. Faculty perceptions about infrastructure as a perceived barrier to diffusion of WBDE did not differ by stage in the innovation-decision process, F (5, 262)=0.46, p>0.05. A negligible effect size (f=0.09) was found.

Objective Nine: Conclusions

Faculty members' stage in the innovation-decision process had no significant influence on faculty perceptions about nine of the ten barriers to diffusion of WBDE (concerns about time, concerns about incentives, financial concerns, planning issues, fear of technology, technical expertise, administrative support, and infrastructure). It had, however, significant impact on faculty perceptions about WBDE credibility as a barrier to diffusion of WBDE. Faculty who stayed in the later stages in the innovation-decision process (stage of “implementation” and “confirmation”) and in earlier stages in the innovation-decision process (stage of “no knowledge” and “knowledge”) tended to perceive WBDE program credibility as a more moderate barrier to diffusion of WBDE than did faculty who were in the middle stage of the innovation-decision process (stage of “persuasion” and “decision”).

Objective Nine: Implications

Faculty members’ stage in the innovation-decision does not have to be taken into consideration when considering their perception about concerns about time, concerns about incentives, financial concerns, planning issues, fear of technology, technical expertise, administrative support, and infrastructure as barriers to diffusion of WBDE. Faculty members’ stage, however, needs to be taken into account when considering their perceptions about WBDE program credibility as a barrier to diffusion of WBDE. The findings implicate that faculty in different stages in the innovation-decision have similar perceptions about concerns about time, concerns about incentives, financial concerns, planning issues, fear of technology, technical expertise, administrative support, and infrastructure as barriers to diffusion of WBDE, while they have significantly different perceptions about WBDE program credibility as a barrier to diffusion of WBDE.

Objective Nine: Recommendations

Further research is recommended to study why faculty who stayed in later stage in the innovation-decision process (stage of “implementation” and “confirmation”) and in earlier stages in the innovation-decision process (stage of “no knowledge” and “knowledge”) tended to perceive WBDE program credibility as more moderate barrier to diffusion of WBDE than did faculty who were in the middle stage of the innovation-decision process (stage of “persuasion” and “decision”).

Objective Ten: Key Findings

The purpose of objective ten was to examine the relationship between faculty perceptions about attributes of WBDE and their perceptions about barriers to diffusion of WBDE. Statistically significant and low negative relationships were found between perceived relative advantage of WBDE and WBDE program credibility (r (271)=-0.19, p<0.05) and planning issues (r (271)=-0.19, p<0.05) as perceived barriers to diffusion of WBDE. Correlations between faculty perceptions about relative advantage of WBDE and their perceptions about other eight barriers to diffusion of WBDE were not significant and the relationships were negligible and ranged between r=-0.07 to r=0.01.

Statistically significant and low negative relationship was found between perceived compatibility of WBDE and planning issues (r (271)=-0.16, p<0.05) as a perceived barrier to diffusion of WBDE. Correlations between faculty perceptions about compatibility of WBDE and their perceptions about other nine barriers to diffusion of

WBDE were not significant and the relationships were negligible and ranged between r=-0.11 to r=0.00.

Statistically significant and low negative relationships were found between perceived complexity of WBDE and WBDE program credibility (r (271)=-0.19, p<0.05), technical expertise (r (272)=-0.17, p<0.05), administrative support (r (271)=-0.17, p<0.05), planning issues (271)=-0.15, p<0.05), financial concerns (r (265)=-0.13, p<0.05), and concerns about time (r (271)=-0.13, p<0.05) as perceived barriers to diffusion of WBDE. Correlations between faculty perceptions about complexity of WBDE and their perceptions about other four barriers to diffusion of WBDE were not significant and the relationships were negligible and ranged between r=-0.12 to r=-0.03.

Statistically significant and low negative relationship was found between perceived trialability of WBDE and WBDE program credibility(r (269) =-0.19, p<0.05) as a perceived barrier to diffusion of WBDE. Correlations between faculty perceptions about trialability of WBDE and their perceptions about other nine barriers to diffusion of WBDE were not significant and the relationships were negligible and ranged between r=0.00 to r=-0.10.

As to correlations between faculty perceptions about observability of WBDE and their perceptions about barriers to diffusion of WBDE, Correlations between faculty perceptions about observability of WBDE and their perceptions about other barriers to diffusion of WBDE were not significant and the relationships were not statistically significant and the relationships were negligible and ranged between r=-0.11to r=0.01.

Objective Ten: Conclusions

Four of the five perceived attributes of WBDE (relative advantage, compatibility, complexity, trialability) were correlated with at least one kind of perceived barrier to diffusion of WBDE. No relationship was found between perceived observability and the perceived barrier to diffusion of WBDE. Perceived complexity of WBDE has correlated with six of the ten perceived barriers: WBDE program credibility, technical expertise, administrative support, planning issues, financial concerns, and concerns about time. Perceived relative advantage of WBDE has correlated with WBDE program credibility, and planning issues. Perceived compatibility of WBDE shows correlated with planning issues. Perceived trialability of WBDE has correlated with WBDE program credibility.

Objective Ten: Implications

Changes in faculty perceptions about six barriers (WBDE program credibility, technical expertise, administrative support, planning issues, financial concerns, and concerns about time) would significantly influence faculty perceptions about complexity of WBDE. If faculty perceived any one of the six barriers as less serious barriers, they would tend to more agree with the existence of complexity of WBDE. If any one of the six barriers were eliminated, faculty would agree more with the existence of complexity of WBDE.

Changes in faculty perceptions about two barriers (WBDE program credibility and planning issues) would significantly influence faculty perceptions about relative advantage of WBDE. If faculty perceived WBDE program credibility or planning issues as less serious barrier, they would tend to more agree with the existence of relative advantage of WBDE. If any one of the two barriers were eliminated, faculty would agree more with the existence of relative advantage of WBDE.

Changes in faculty perceptions about planning issues as barriers to diffusion of WBDE would significantly influence faculty perceptions about compatibility of WBDE. If faculty perceived planning issues as less serious barrier, they would tend to more agree with the existence of compatibility of WBDE. If planning issues as a barrier to diffusion of WBDE were eliminated, faculty would agree more with the existence of compatibility of WBDE.

Changes in faculty perceptions about WBDE program credibility as barriers to diffusion of WBDE would significantly influence faculty perceptions about trialability of WBDE. If faculty perceived WBDE program credibility as less serious barrier, faculty would agree more with the existence of trialability of WBDE. If WBDE program credibility as a barrier to diffusion of WBDE were eliminated, faculty would agree more with the existence of trialability of WBDE.

Changes in faculty perceptions about the ten barriers would not significantly impact faculty perceptions about observability of WBDE. If any of the ten barriers were eliminated, there would no impact faculty perceptions about observability of WBDE.

Objective Ten: Recommendations

To decrease faculty members' perceived complexity of WBDE, actions are recommended to increase WBDE program credibility, technical expertise, administrative support, planning issues and to decrease financial concerns, time concerns. To increase faculty members' perceived relative advantage of WBDE, actions are recommended to increase WBDE program credibility and planning issues. To increase faculty members' perceived compatibility of WBDE, actions are recommended to increase planning strategies. To increase faculty members' perceived trialability of WBDE, actions are recommended to increase WBDE program credibility.

Additional Implications and Recommendations

The Study Contributes to Better Understanding WBDE at the China Agricultural University

This study discovered information in ten areas: (1) faculty members' personal characteristics, such as professional area, gender, age, level of education, academic rank, teaching experience, and distance education experience; (2) faculty members' stage in the innovation-decision process related to WBDE; (3) faculty perceptions about attributes of WBDE; (4) faculty perceptions about barriers to diffusion of WBDE; (5) the relationship between faculty personal characteristics and their stage in the innovation-decision process; (6) relationship between faculty personal characteristics and their perceptions about attributes of WBDE; (7) relationship between faculty personal characteristics and their perceptions about barriers to diffusion of WBDE; (8) relationship between faculty members' stage in the innovation-decision process and faculty perceptions about attributes of WBDE; (9) relationship between faculty members' stage in the innovation-decision process and faculty perceptions about barriers to diffusion of WBDE, and (10) relationship between faculty perceptions about attributes of WBDE and faculty perceptions about barriers to diffusion of WBDE.

The randomly selected 273 faculty at the China Agricultural University were involved in twelve professional areas and they were male-dominant. The majority of them were between 30 and 54 years old. Most of them had bachelor and above education and more than half received doctoral degree. The majority of them were associate professors or professors. The majority of them had more than five years' teaching experience and more than half of them have ten or above years' teaching experience. Twenty-nine percent of CAU faculty had distance education experience. The study found 47 out of 273 indicated having WBDE experience and the length of experience varied from one to five years; 21 out of 273 indicated having participated into TV and Broadcasting programs and the length of experience varied from one to twenty-three years; 23 out of 273 showed experience in correspondence education program and the length of experience varied from one to fifteen years.

The study found limited access to higher education by students was still perceived as a big problem for Chinese institutions of higher education by the majority of CAU faculty and most of the faculty also agreed that WBDE might be a good solution to the problem. Participants' attitude toward the problem did not differ by (1) their stage in the innovation-decision process; (2) six personal characteristics (professional area, gender, age, level of education, academic rank, and teaching experience); (3) their perceptions about five attributes (relative advantage, compatibility, complexity, trialability, and observability); and (4) their perceptions about nine barriers (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, technical expertise, administrative support, infrastructure). However, participants' attitude toward the problem differed significantly by their perceptions about one barrier (fear of technology) and by one personal characteristic (their distance education experience).

The majority of CAU faculty were found to be in early stages in the innovation-decision process related to WBDE (no knowledge, knowledge, or persuasion). Professional area, level of education, teaching experience, and distance education experience would impact significantly about faculty members' stage in the process. Gender, age, and academic rank have no significant influence on faculty members' stage in the process.

The study found that CAU faculty tended to agree with the existence of the five attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability). Their perceptions about the five attributes would not be influenced by such personal characteristics as professional area, gender, age, level of education, and academic rank. Teaching experience had no significant influence on faculty perceptions about four of the five attributes of WBDE (relative advantage, complexity, trialability, and observability). It had significant impact, however, on faculty members' perceived compatibility of WBDE. Distance education experience had no significant influence on faculty perceptions about three of the five attributes of WBDE (relative advantage, complexity, and trialability). It had significant impact, however, on faculty members' perceived compatibility and observability of WBDE.

The study found that CAU faculty tended to look all of the ten listed items (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, fear of technology, technical expertise, administrative support, and infrastructure) as moderate barriers to diffusion of WBDE. Such personal characteristics as age, levels of education, academic rank, teaching experience, and distance education experience had no significant influence on faculty perceptions about the ten barriers to diffusion of WBDE. Professional area had no significant influence on faculty perceptions about nine of the ten barriers to diffusion of WBDE. It had significant impact, however, on faculty perceptions about concerns about time as a barrier to diffusion of WBDE. Gender had no significant influence on faculty perceptions about nine of the ten barriers to diffusion of WBDE. It had significant impact, however, on faculty perceptions about concerns about time as a barrier to diffusion of WBDE.

The study found that faculty members' stage in the innovation-decision process related to WBDE had no significant influence on faculty perceptions about relative advantage of WBDE. It had significant impact, however, on faculty perceptions about the other four attributes of the WBDE (compatibility, complexity, trialability, and observability). Faculty who stayed in later stage in the innovation-decision process tended to more agree with the existence of compatibility, complexity, trialability, and observability of WBDE than did faculty who stay in earlier stages.

The study found that faculty members' stage in the innovation-decision process had no significant influence on faculty perceptions about nine of the ten barriers to diffusion of WBDE (concerns about time, concerns about incentives, financial concerns, planning issues, fear of technology, technical expertise, administrative support, and infrastructure). It had significant impact, however, on faculty perceptions about WBDE credibility as a barrier to diffusion of WBDE. Faculty who stayed in later stage in the innovation-decision process ("implementation" and "confirmation" stages) and in early stages in the innovation-decision process ("no knowledge" and "knowledge" stages) tended to perceive WBDE program credibility as more moderate barrier to diffusion of WBDE than did faculty who are in the middle stage of the innovation-decision process.

The study found faculty perceptions about complexity of WBDE had correlated with six of the ten perceived barriers: WBDE program credibility, technical expertise, administrative support, planning issues, financial concerns, and concerns about time. Faculty perceptions about relative advantage of WBDE have correlated with WBDE program credibility and planning issues. Faculty perceptions about compatibility of WBDE show correlated with planning issues. Faculty perceptions about trialability of WBDE have correlated with WBDE program credibility.

The Study Provides Better Guidance for Implementation of WBDE Programs in Chinese Agricultural Higher Education System

Researchers and administrative officers who are involved in WBDE programs at the China Agricultural University may use findings of the study to modify the process in implementing the WBDE program. The study implicated that:

1. The following factors do not have to be taken into account when considering faculty members' attitude toward problem of limited access to higher education by students: (1) faculty members' stage in the innovation-decision process; (2) six personal characteristics (professional area, gender, age, level of education, academic rank, and teaching experience); (3) faculty perceptions about the five attributes of WBDE (relative advantage, compatibility, complexity, trialability, and observability); and (4) faculty perceptions about nine barriers (concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, conflict with traditional education, technical expertise, administrative support, and infrastructure). Faculty perceptions about fear of technology as a barrier to diffusion of WBDE and faculty members' distance education experience, however, need to be taken into account when considering faculty members' attitude toward the problem.
2. Gender, age, and academic rank do not have to be taken into consideration when considering faculty members' stage in the innovation-decision process. Impact of professional area, level of education, teaching experience, and distance education experience needs to be taken into account when thinking of faculty members' stage in the innovation-decision process.
3. Professional area, gender, age, level of education, and academic rank do not have to be taken into consideration when considering faculty perceptions about the five attributes of WBDE.
4. Teaching experience does not have to be taken into consideration when considering faculty perceptions about relative advantage, complexity, trialability, and

observability of WBDE. It needs to be taken into account, however, when considering faculty perceptions about compatibility of WBDE.

5. Distance education experience does not have to be taken into consideration when considering faculty perceptions about relative advantage, compatibility, complexity, and trialability of WBDE. It needs to be taken into account, however, when considering faculty perceptions about compatibility and observability of WBDE.
6. Factors such as age, level of education, academic rank, teaching experience, distance education experience do not have to be taken into consideration when considering faculty perceptions about concerns about time, concerns about incentives, WBDE program credibility, financial concerns, planning issues, fear of technology, conflict with traditional education, technical expertise, administrative support, and infrastructure as barriers to diffusion of WBDE.
7. Professional area does not have to be taken into consideration when considering faculty perceptions about concerns about incentives, WBDE program credibility, financial concerns, planning issues, fear of technology, conflict with traditional education, technical expertise, administrative support, and infrastructure as barriers to diffusion of WBDE. It needs to be taken into account, however, when considering faculty perceptions about concerns about time as a barrier to diffusion of WBDE.
8. Gender does not have to be taken into consideration when considering faculty perceptions about concerns about incentives, WBDE program credibility, financial concerns, planning issues, fear of technology, conflict with traditional education, technical expertise, administrative support, and infrastructure as barriers to diffusion

of WBDE. It needs to be taken into account, however, when considering faculty perceptions about concerns about time as a barrier to diffusion of WBDE.

9. Faculty members' stage in the innovation-decision process does not have to be taken into account when considering faculty perceptions about relative advantage of WBDE. It needs to be taken into account, however, when considering faculty perceptions about compatibility, complexity, trialability, and observability of WBDE.
10. Faculty members' stage in the innovation-decision does not have to be taken into consideration when considering their perception about concerns about time, concerns about incentives, financial concerns, planning issues, fear of technology, technical expertise, administrative support, and infrastructure as barriers to diffusion of WBDE. It needs to be taken into account, however, when considering faculty perceptions about WBDE program credibility as barriers to diffusion of WBDE.

The Study Enriches Diffusion of Innovation Theory

The study enriches diffusion of innovation theory in several aspects:

1. The study applied Rogers' (2003) model of five stages in the innovation-decision process in diffusion of WBDE at the China Agricultural University and expanded the model by adding one more stage named "no knowledge" in the beginning of the innovation-decision process.
2. The study applied Rogers' (2003) attributes of innovation theory in studying attributes of WBDE at the China Agricultural University. The study found that CAU

faculty tended to agree with the existence of such attributes as relative advantage, compatibility, complexity, trialability, and observability of WBDE.

3. The study agreed with Rogers' (2003) viewpoint about previous practice as an important prior condition to one's innovation-decision process by finding teaching experience and distance education experience had positive impact on faculty members' adoption behavior.
4. The study applied Rogers' (2003) characteristics of adopter categories theory in studying China Agricultural University faculty members' personal characteristics and their influence on faculty members' stage in the innovation-decision process and on faculty perceptions about attributes and barriers impacting diffusion of WBDE.
5. The study confirmed Rogers' (2003) generalization that the earlier adopters are not different from later adopters in age.
6. The study challenged Rogers' (2003) generalizations that the relatively earlier adopters in a social system have more years of formal education and have higher social status by finding (1) level of education showed a significant negative impact on faculty members' stage in the innovation-decision process; and (2) academic rank did not show significant impact on faculty members' stage in the process.
7. The study enriched Rogers' (2003) diffusion of innovation theory by studying the relationship between potential adopters' stage in the innovation-decision process and their perceptions about attributes of innovation. The study found that potential adopters' stage in the innovation-decision process would significantly influence their perceptions about most of the attributes of an innovation.

8. The study enriched Rogers' (2003) diffusion of innovation theory by studying the relationship between potential adopters' stage in the innovation-decision process and their perceptions about barriers to diffusion of an innovation. The study found that potential adopters' stage in the innovation-decision process would significantly influence their perceptions about some of the barriers to diffusion of an innovation.
9. The study enriched Rogers' (2003) diffusion of innovation theory by studying the relationship between potential adopters' perceptions about attributes of an innovation and their perceptions about barriers to diffusion of the innovation. The study found significant and low negative relationship existing between some of perceived attributes of an innovation and perceived barriers to diffusion of the innovation.

The Study Provides a Research Model for Other Researchers about Diffusion of WBDE in Education System

The study was based on (1) Rogers' (2003) model of the innovation-decision process, (2) Rogers' (2003) attributes of innovation theory; (3) Rogers' (2003) characteristics of adopter categories; (4) Moore and Benbasat's (1991) measurements of the attributes of innovation, and (5) Berge's (1999) study about barriers to distance education. Through successfully applying these theoretical bases in studying faculty perceptions about attributes and barrier impacting diffusion of WBDE at the China Agricultural University, the study provides a research model for other researchers around the world to study problems related to diffusion of WBDE in education system.

Recommendations for Future Studies

More studies are recommended in these areas:

1. What is the role of female faculty, as non-dominant group, in making innovation related decisions at the China Agricultural University?
2. What are differences in faculty perceptions about TV and broadcasting programs, correspondence programs, and WBDE according to the program's strengthen, weakness, motivators, and inhibitors
3. How do experience with TV and Broadcasting programs and correspondence education program impact faculty members' attitude toward WBDE?
4. How would innovativeness and norms of the social systems, as other two prior conditions (Rogers, 2003), influence faculty members' stage in the innovation-decision process at the China Agricultural University?
5. What is the change in faculty members' stage in the innovation-decision process related to WBDE at the China Agricultural University after a certain period of time (such as five years, ten years, twenty years, and etc.)?
6. Are there any other aspects of attributes of WBDE as well as other unmentioned barriers to diffusion of WBDE programs in the eyes of CAU faculty?
7. Input/output and benefit analysis about investment in WBDE-related infrastructure by university, the Ministry of Education, or the Ministry of Agricultural.
8. What is the effectiveness of WBDE and whether there is difference between quality of traditional education and that of WBDE at the China Agricultural University or other Chinese universities?

9. What are faculty perceptions about intrinsic and extrinsic motivations inhibitors for adopting WBDE?
10. What are role and function of organization and culture in diffusion of WBDE at the China Agricultural University?
11. Why does level of education have a negative impact on CAU faculty members' stage in the innovation-decision process?
12. How to design online course for curriculum areas related to engineering or biology?
13. How to combine online lecture and lab, workshop, or hand-on activities in engineering or biology related majors?
14. Why did faculty with 15-19 years of teaching experiences tend to more agree with the compatibility of WBDE?
15. Why would teaching experience impact significantly faculty perceptions about compatibility of WBDE?
16. Why would distance education experience impact significantly faculty perceptions about compatibility and observability of WBDE?
17. Why would age, academic rank, distance education experience influence significantly faculty perceptions about inhibiting factors for participating in distance education in Schifter's (2000) study while they had no significant influence on China Agricultural University faculty perceptions about the barriers to diffusion of WBDE?
18. Why would professional background and gender influence faculty members' perceptions about time in WBDE program?

19. Why did faculty who were in later stage in the innovation-decision process (stage of "implementation" and "confirmation") and in earlier stages in the innovation-decision process (stage of "no knowledge" and "knowledge") tend to perceive WBDE program credibility as more moderate barrier to diffusion of WBDE than did faculty who were in the middle stage of the innovation-decision process (stage of "persuasion" and "decision")?
20. What are faculty perceptions about attributes and barriers impacting diffusion of WBDE in other Chinese universities, especially agricultural universities?
21. What are students' perceptions about factors impacting diffusion of WBDE?

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APPENDIX A

INSTITUTIONAL REVIEW BOARD-HUMAN SUBJECTS IN RESEARCH APPROVAL LETTER

Office of the Vice President for Research

Office of Research Compliance

Administration and Special Programs

Academy for Advanced Telecommunication and Learning Technologies

Institute for Scientific Computation

Laboratory Animal Resources and Research

Microscopy and Imaging Center

Office of Business Administration

Office of Graduate Studies

Office of Sponsored Projects

Texas A&M University Research Park

September 25, 2003

MEMORANDUM

TO: Ms. Yan Li
Department of Agricultural Education
MS 2116

FROM: Dr. Gaile S. Cannella, Chair Gaile S. Cannella
Institutional Review Board
MS 1112

SUBJECT: IRB Protocol Review

Title: "Faculty Perceptions about Attributes and Barriers Impacting Diffusion of Web-based Distance Education at the China Agricultural University"
Protocol Number: 2003-0445
Review Category: Expedited Review
Approval Date: September 25, 2003 – September 24, 2004

The approval determination was based on the following Code of Federal Regulations: 45 CFR 46.110(b)(1) – Some or all of the research appearing on the list and found by the reviewer to involve no more than minimal risk.

Remarks: None

The Institutional Review Board – Human Subjects in Research, Texas A&M University has reviewed and approved the above referenced protocol. Your study has been approved for one year. As the principal investigator of this study, you assume the following responsibilities:

Renewal: Your protocol must be re-approved each year in order to continue the research. You must also complete the proper renewal forms in order to continue the study after the initial approval period.

Adverse events: Any adverse events or reactions must be reported to the IRB immediately.

Amendments: Any changes to the protocol, such as procedures, consent/assent forms, addition of subjects, or study design must be reported to and approved by the IRB.

Informed Consent/Assent: All subjects should be given a copy of the consent document approved by the IRB for use in your study.

Completion: When the study is complete, you must notify the IRB office and complete the required forms.

Texas A&M University

1112 TAMU
18 Administration Building
College Station, Texas
77843-1112

979.845.8585
FAX 979.862.3176

Justification for waiver of signed consent
(Required only if requesting waiver of signature on consent document)
*Note: Information sheet must be submitted and written in third person of the subject

I certify that my research study meets all of the following criteria:

✔ **45 CFR 46.116**

1. The research involves no more than minimal risk to the subjects;
2. The waiver of alteration will not adversely affect the rights and welfare of the subjects;
3. The research could not practicably be carried out without the waiver or alteration; and
4. Whenever appropriate, the subjects will be provided with additional pertinent information after participation.

or

___ **45 CFR 46.117**

1. The only record linking the subject and the research would be the consent document and the principal risk would be potential harm resulting from a breach of confideniality. Each subject will be asked whether the subject wants documentation linking the subject with the research, and the subject's wishes will govern; or
2. That the research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context. In cases in which the documentation requirement is waived, the IRB may require the investigator to provide subjects with a written statement regarding the research.

Faculty Perceptions about Barriers Impacting Diffusion of Web-based Distance Education at
Project Title

Yan Li
Signature

09/15/03
Date

Yan Li
Print Name

Approved by
Texas A&M University IRB
SEP 25 2003
Exp Sep 24, 2004
Protocol # 2003-0445

Email irb@tamu.edu or call (979) 458-4067 with any questions regarding this form.

TEXAS A&M UNIVERSITY
College of Agriculture and Life Sciences
Department of Agricultural Education
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College Station, Texas 77843-2116
(979) 845-2951
FAX (979) 845-6296
http://aged.tamu.edu

September 15, 2003

Dear faculty member:

Since 1997, Web-based distance education has been developed rapidly in Chinese higher education institutions. China Agricultural University began to use Web-based distance education in 2001 and now there are about 70 faculty members who are involved in the programs. Because of short history, limited studies have been done related to the diffusion of Web-based distance education in higher education. This study is conducted to determine faculty's perception about the attributes of Web-based distance education and barriers to the development of Web-based distance education at the China Agricultural University.

We are requesting your assistance in helping to fill in the survey related to attributes and barriers impacting diffusion of Web-based distance education. Participating in this study will take no more than ten minutes of your time. Approximately 300 professors and associate professors are being asked to participate in this study. The instrument is the attached questionnaire. All individual responses are confidential. No individual information about the respondent will be published or disclosed. The questionnaires have been coded to track those who do not respond. If you are uncomfortable with any statement or question, you do not have to answer it. Once you have completed the survey, please return it by January 10, 2004 in the prepaid envelope provided.

This research study has been reviewed and approved by the Institutional Review Board - Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subject's rights, contact the institutional Review Board through Dr. Michael W. Buckley, Director of Compliance and Administration, Office of Vice President for Research at (979) 845-1855.

For any other problems or questions, please contact the principal investigator by telephone at 1- 979-458-3047 or email at yan_li@tamu.edu. Again, thank you for participating in this study.

Your time and effort is greatly appreciated!

Sincerely,

Yan Li

Yan Li
Doctoral Candidate
Department of Agricultural Education
Texas A&M University
2116 TAMU
College Station, Texas 77843-2116

ph: 979-862-9207
fx: 979-458-2698
em: yan_li@tamu.edu

James R Lindner

James R. Lindner
Assistant Professor
Department of Agricultural Education
Texas A&M University
2116 TAMU
College Station, Texas 77843-2116

ph: 979-458-2701
fx: 979-458-2698
em: j-lindner@tamu.edu

Approved by
Texas A&M University IRB
SEP 25 2003
Exp Sep 24 2004
Protocol # 2003-0416

Enclosure : One double-sided survey and return envelope.

TEXAS A&M UNIVERSITY
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http://aged.tamu.edu

September 15, 2003

亲爱的中国农业大学老师:

自从 1997 首次被使用, 网络教育在中国高校迅猛发展, 中国农业大学于 2001 年也采用了网络教育项目. 到目前为止, 大约有 70 位老师已参与到其中. 由于实施的时间很短,有关网络教育在中国高校中传播的研究极其有限. 本研究的目的就是为了探究中国农业大学教师群体对网络教育的属性和障碍因素的看法.

在此我们需要您的帮助来完成这次有研究的问卷调查. 本次问卷将花费您十分钟左右的时间. 大约 300 位中国农业大学的教授和副教授被邀请参加本次问卷调查. 问卷内容附在此信中, 所有参与人员的回答将严格保密, 任何个人信息和回答不会被发表或泄露. 问卷结果将以统计结果的形式做整体分析, 为方便对有效问卷的统计, 我们将对问卷做编码. 如果您对问卷的任何陈述或问题有意见, 您有权不做回答. 请在 2004 年 1 月 10 日前将完成的问卷寄回,非常感谢您的参与.

本次研究经德克萨斯农业与工程大学学术审核机构的审查和通过. 如有与研究或与参与者权益有关的问题,请通过德克萨斯农业与工程大学副校长办公室负责学术审核机构及日常及行政工作的 Dr. Michael W. Buckley 主任联系. 联系电话: 1-979-845-1855.

另外, 如果您对本次问卷有任何疑义, 请随时与我联系: yan_li@tamu.edu 或 1-979-862-9207. 再次感谢您宝贵的时间和积极的参与, 您的贡献将促成我们对网络教育项目在中国农业大学传播的更好认识.

诚挚的,

Yan Li

李艳
博士候选人
农业教育系
德克萨斯农业与工程大学
2116 TAMU
大学城, 德克萨斯州, 77843-2116

电话: 979-862-9207
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电子邮件: yan_li@tamu.edu

James R. Lindner

James R. Lindner
助理教授
农业教育系
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电子邮件: j-lindner@tamu.edu

Approved by
Texas A&M University IRB
SEP 25 2003
Exp Sep 24, 2004
Protocol # 2003-0445

附件:一份双面打印的问卷及回邮信封.

APPENDIX B

PILOT TEST COVER LETTERS

Hello, Every AGED faculty!

This is ***Yan Li***. I am now working on my dissertation and preparing proposal and survey instrument.

As part of my ***DISSERTATION***, I am determining faculty perceptions about attributes and barriers impacting diffusion of web-based distance education at the university faculty level. ***Attached is a pilot questionnaire***. Please spend just ***10 minutes of your time*** filling it out, and then providing feedback on the questionnaire's readability, clarity, errors in the layout, content and face validity, and any other suggestions that could help improve the survey instrument.

Please ***RETURN THE SURVEY*** with your comments to
218 Scoates Hall
by
Friday, June 27th, 2003

Your comments and constructive recommendation would be very helpful in my research work.

<u>Your time, effort, help, and expertise are greatly appreciated!</u>

Sincerely,

Yan Li
Graduate Student
218 Scoates Hall
College Station, TX, 77843-2116
(979) 458-3047
yan_li@tamu.edu

More Help Needed!

Dear faculty members:

Thank you for your support for my research work by filling out the pilot test of the survey instrument. Your comments have been seriously considered in revising the instrument. Reliability analysis indicated that reliabilities of most items in the survey were quite good. However, reliabilities of three items showed not so satisfactory results. Thus I reorganized the statements for each of the three items and ask for your help again to fill them out. Then, I could retest their reliabilities. It will take 2-3 minutes of your time. Your help would be sincerely appreciated!

Please return your response with comments to 2116 TAMU (my departmental mailbox) as soon as possible.

Thanks again!

Yan Li

APPENDIX C

PANEL OF EXPERTS

Panel of Experts

Dr. Gary Briers, Professor and Associate Department Head, Department of Agricultural Education, Texas A&M University

Dr. James Christiansen, Professor, Department of Agricultural Education, Texas A&M University

Dr. Kim Dooley, Associate Professor, Department of Agricultural Education, Texas A&M University

Dr. Jimmy Lindner, Assistant Professor, Department of Agricultural Education, Texas A&M University

Dr. Theresa Murphrey, Visiting Assistant Professor, Department of Agricultural Education, Texas A&M University

Dr. Tim Murphy, Associate Professor and Assistant Department Head, Department of Agricultural Education, Texas A&M University

Dr. Glen Shinn, Professor and Department Head, Department of Agricultural Education, Texas A&M University

Dr. Gary Wingenbach, Assistant Professor, Department of Agricultural Education, Texas A&M University

APPENDIX D

INVITATION LETTER TO AD HOC ADVISOR

TEXAS A&M UNIVERSITY
College of Agriculture and Life Sciences
Department of Agricultural Education
2116 TAMU
College Station, Texas 77843-2116
(979) 845-2951
FAX (979) 845-6296
http://aged.tamu.edu

July 10, 2003

Dr. Gao Qijie
Center for Extension and Innovation Management
CIAD/COHD, China Agricultural University
Beijing 100094, P. R. China
Tel: 8610-62891492
Email: gaoqj@cau.edu.cn

Dear Dr. Gao QiJie:

Thanks for your interest in Yan Li's graduate studies at Texas A&M University. Your communications and suggestions will be extremely helpful in assisting Ms. Li to complete her dissertation in a timely manner. I know that you are very busy, and I appreciate your taking time to help her complete her dissertation at Texas A&M University. We are delighted that Ms. Li will be conducting her dissertation at the China Agricultural University with your assistance.

Considering your excellent knowledge base, expertise, and professional experiences in area of extension and innovation management, we would like to invite you with great sincerity to be an Ad Hoc Advisor for her doctoral studies. As an Ad Hoc Advisor, your advise, suggestions, and guidance will help Ms. Li complete her studies, without obligating you with the formality of being involved in formal examinations and approval of her dissertation. Your contributions, however, will be noted and included in her dissertation. Time and technology permitting, we would like you to participate in her final oral presentation and examination. This can be accomplished using interactive video conferencing.

As you know, the title of her dissertation is "Faculty Perception about Attributes and Barriers Impacting Diffusion of Web-based Distance education at the China Agricultural University." The purpose of her study is to describe faculty perceptions about attributes and barriers impacting diffusion of web-based distance education programs at the China Agricultural University. Using Rogers (1995) work on diffusion of innovations, Ms. Li has developed an instrument to gather data on the specific objectives of her study.

Web-based distance education (WBDE) has been rapidly diffused in universities throughout the United States. In China, however, WBDE has not been readily adopted and diffused yet, even though limited access to higher education is a problem for Chinese institutions of higher education. WBDE may be a way for Chinese institutions of higher education to overcome this problem. Research-based information on faculty perceptions about attributes and barriers impacting the diffusion of Web-based distance education at the China Agricultural University may provide useful insights into how Chinese institutions of higher education can adopt and diffuse WBDE more rapidly or identify barriers to adoption and diffusion.

Attached to this letter are several documents that will give you additional information about Ms. Li's study: resume, dissertation research proposal, research questionnaire, and time schedule. We look forward to your assistance as Ms. Li's progresses through her graduate studies at Texas A&M University. If you have any questions about the research or your role, please contact Ms. Li or myself. I am pleased and excited that two world renowned Universities are able to collaborate on this effort and hope that this partnership can continue in the future.

Sincerely,

James R. Lindner

James R. Lindner
Assistant Professor
Chair Graduate Advisory Committee for Yan Li
Department of Agricultural Education
Texas A&M University
2116 TAMU
College Station, Texas 77843-2116

ph: 979-458-2701
fx: 979-458-2698
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Yan Li
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ph: 979-458-2701
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em: yan_li@tamu.edu

cc: Dr. Glen C. Shinn, Professor and Chair, Department of Agricultural Education, TAMU
Dr. James E. Christiansen, Professor, International Agricultural Development Coordinator

APPENDIX E

INVITATION LETTER TO PARTICIPANTS

(ENGLISH AND CHINESE VERSION)

TEXAS A&M UNIVERSITY
College of Agriculture and Life Sciences
Department of Agricultural Education
2116 TAMU
College Station, Texas 77843-2116
(979) 845-2951
FAX (979) 845-6296
http://aged.tamu.edu

September 15, 2003

Dear faculty member:

Since 1997, Web-based distance education has been developed rapidly in Chinese higher education institutions. China Agricultural University began to use Web-based distance education in 2001 and now there are about 70 faculty members who are involved in the programs. Because of short history, limited studies have been done related to the diffusion of Web-based distance education in higher education. This study is conducted to determine faculty's perception about the attributes of Web-based distance education and barriers to the development of Web-based distance education at the China Agricultural University.

We are requesting your assistance in helping to fill in the survey related to attributes and barriers impacting diffusion of Web-based distance education. Participating in this study will take no more than ten minutes of your time. Approximately 300 professors and associate professors are being asked to participate in this study. The instrument is the attached questionnaire. All individual responses are confidential. No individual information about the respondent will be published or disclosed. The questionnaires have been coded to track those who do not respond. If you are uncomfortable with any statement or question, you do not have to answer it. Once you have completed the survey, please return it by January 10, 2004 in the prepaid envelope provided.

This research study has been reviewed and approved by the Institutional Review Board - Human Subjects in Research, Texas A&M University. For research-related problems or questions regarding subject's rights, contact the Institutional Review Board through Dr. Michael W. Buckley, Director of Compliance and Administration, Office of Vice President for Research at (979) 845-1855.

For any other problems or questions, please contact the principal investigator by telephone at 1- 979-458-3047 or email at yan_li@tamu.edu. Again, thank you for participating in this study.

Your time and effort is greatly appreciated!

Sincerely,

Yan Li
Doctoral Candidate
Department of Agricultural Education
Texas A&M University
2116 TAMU
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ph: 979-862-9207
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James R Lindner

James R. Lindner
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ph: 979-458-2701
fx: 979-458-2698
em: j-lindner@tamu.edu

Enclosure : One double-sided survey and return envelope.

TEXAS A&M UNIVERSITY
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FAX (979) 845-6296
http://aged.tamu.edu

September 15, 2003

亲爱的中国农业大学老师:

自从 1997 首次被使用, 网络教育在中国高校迅猛发展, 中国农业大学于 2001 年也采用了网络教育项目. 到目前为止, 大约有 70 位老师已参与到其中. 由于实施的时间很短,有关网络教育在中国高校中传播的研究极其有限. 本研究的目的就是为了探究中国农业大学教师群体对网络教育的属性和障碍因素的看法.

在此我们需要您的帮助来完成这次有研究的问卷调查. 本次问卷将花费您十分钟左右的时间. 大约 300 位中国农业大学的教授和副教授被邀请参加本次问卷调查. 问卷内容附在此信中, 所有参与人员的回答将严格保密, 任何个人信息和回答不会被发表或泄露. 问卷结果将以统计结果的形式做整体分析, 为方便对有效问卷的统计, 我们将对问卷做编码. 如果您对问卷的任何陈述或问题有意见, 您有权不做回答. 请在 2004 年 1 月 10 日前将完成的问卷寄回,非常感谢您的参与.

本次研究经德克萨斯农业与工程大学学术审核机构的审查和通过. 如有与研究或与参与者权益有关的问题,请通过德克萨斯农业与工程大学副校长办公室负责学术审核机构及日常及行政工作的 Dr. Michael W. Buckley 主任联系. 联系电话: 1-979-845-1855.

另外, 如果您对本次问卷有任何疑义, 请随时与我联系: yan_li@tamu.edu 或 1-979-862-9207. 再次感谢您宝贵的时间和积极的参与, 您的贡献将促成我们对网络教育项目在中国农业大学传播的更好认识.

诚挚的,

Yan Li
李艳
博士候选人
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德克萨斯农业与工程大学
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James R. Lindner
James R. Lindner
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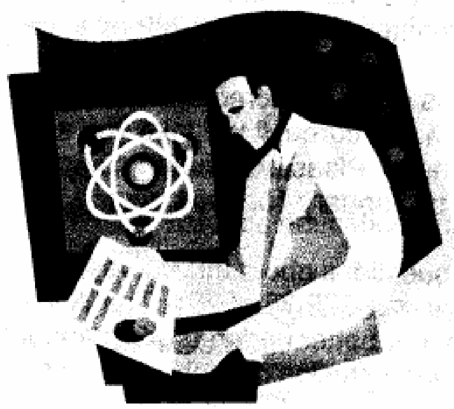
附件:一份双面打印的问卷及回邮信封.

APPENDIX F

QUESTIONNAIRE

(ENGLISH AND CHINESE VERSION)

FACULTY PERCEPTIONS ABOUT ATTRIBUTES AND BARRIERS IMPACTING DIFFUSION OF WEB-BASED DISTANCE EDUCATION AT THE CHINA AGRICULTURAL UNIVERSITY



QUESTIONNAIRE

The following questionnaire is designed to gather data on faculty perception about attributes and barriers impacting diffusion of Web-based distance education at the China Agricultural University. For the purpose of the study, Web-based distance education is defined as an educational method in which Web-based technologies (computer, Internet, electronic mail, multimedia technologies, etc.) are the main tools through which instructors and their students come together to accomplish a certain teaching and learning process in a certain period of time.

The questionnaire is divided into four parts. Please read the directions for each part before responding. All individual responses are confidential. No individual information about the respondent will be published or disclosed. Your responses will be combined with that of others and reported as grouped data. The questionnaires have been coded to track those who do not respond.

This information is being gathered and analyzed as part of my requirement for completing my Ph.D. degree. It will take you approximately ten minutes to fill out the questionnaire. Please return the completed survey in the prepared return envelope by January 10, 2004.

If you have any questions about this survey, please contact with me at yan_li@tamu.edu or 1-979-862-9207. Thank you for taking time to fill out this questionnaire for our better understanding about the factors that could affect the acceptance and diffusion of Web-based distance education.

Sincerely,

Yan Li
Doctoral Candidate
Department of Agricultural Education
Texas A&M University
2116 TAMU
College Station, Texas 77843-2116

ph: 979-862-9207
fx: 979-458-2698
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James R. Lindner
Assistant Professor
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ph: 979-458-2701
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em: j-lindner@tamu.edu

PART I: STAGES OF THE INNOVATION-DECISION PROCESS

1. Please indicate your attitude toward the statement described below.

Limited access to higher education by students is a big problem for Chinese institutions of higher education.

_______ I agree.

_______ I disagree.

_______ I am not sure.

2. Select the ONE statement that best reflects your current attitude toward distance education.

√ Check One	Statement
_______	I have not used Web-based distance education programs and have no plans for doing it.
_______	Web-based distance education <u>may be</u> a way to reach more students in Chinese higher education.
_______	Web-based distance education <u>is</u> a way to reach more students in Chinese higher education.
_______	I know the benefits of Web-based distance education. In the near future, I will try it in my own teaching.
_______	I am currently using Web-based distance education and it helps me reach students that otherwise do not have access to higher education programs.
_______	I have used Web-based distance education for more than one semester and plan on continuing to do so.

PART II: ATTRIBUTES IMPACTING DIFFUSION OF WEB-BASED DISTANCE EDUCATION

Below is a list of attributes that may impact the diffusion of Web-based distance education. Please read each item carefully and indicate your perception about the influence of each item on the development of Web-based distance education programs.

Use the following scales to indicate your response. Circle the best response.

1=Strongly Disagree (SD)
2=Disagree (D)
3=Neutral (N)
4=Agree (A)
5=Strongly Agree (SA)

Items	SD	D	N	A	SA
1. Relative Advantage					
Using Web-based distance education could reach more students.	1	2	3	4	5
A more flexible time schedule could be followed by using Web-based distance education.	1	2	3	4	5
Using Web-based distance education could give me access to more teaching resources.	1	2	3	4	5
Web-based distance education could be provided economically.	1	2	3	4	5
2. Compatibility					
Web-based distance education technologies are available to me.	1	2	3	4	5
Using Web-based distance education technologies are acceptable to me.	1	2	3	4	5
Procedures used in Web-based distance education would fit well with my teaching conditions.	1	2	3	4	5
Web-based distance education technologies are available to students.	1	2	3	4	5
Continues on Next Page →→→					

Items (cont')	SD	D	N	A	SA
3. Complexity					
Web-based distance education technologies are readily available to faculty.	1	2	3	4	5
Web-based distance education technologies are easy to use.	1	2	3	4	5
The changes in teaching methodology necessary to use Web-based distance education are easy to understand.	1	2	3	4	5
The changes in teaching methodology necessary to use Web-based distance education will be easy for me to implement.	1	2	3	4	5
4. Trialability					
It is possible for me to deliver selected portions of a course (a single lesson or unit) using Web-based distance education prior to developing an entire course.	1	2	3	4	5
It is possible for me currently to put selected teaching materials (e.g., readings, assignments) on the Web in support of my classes.	1	2	3	4	5
It is possible for me currently to accomplish some teaching functions (e.g., reporting grades, communication with students) on the Web.	1	2	3	4	5
It is possible for students to use web-based distance education tools (e.g., Accessing Internet, downloading and uploading materials, watching video lessons, chat on-line, etc.).	1	2	3	4	5
5. Observability					
I know of some faculty members who are using Web-based distance education.	1	2	3	4	5
I have observed some Web-based distance education courses on my campus.	1	2	3	4	5
I am aware of the benefits of Web-based distance education program for students.	1	2	3	4	5
I am aware of the limitations of Web-based distance education programs for students.	1	2	3	4	5

Continues on Next Page →→→

PART III: BARRIERS TO DIFFUSION OF WEB-BASED DISTANCE EDUCATION

Below is a list of possible barriers to Web-based distance education. Please read each item under each group carefully and indicate your perception about the influence of the item on developing Web-based programs of distance education.

Use the following scales to indicate your response. Circle the best response.

1=No Barrier (NB)
2=Weak Barrier (WB)
3=Moderate Barrier (MB)
4=Strong Barrier (SB)
5=Very Strong Barrier (VSB)

Items	NB	WB	MB	SB	VSB
1. Concerns about time					
Increased faculty time commitment for course development.	1	2	3	4	5
Increased faculty time for on-line communication with students.	1	2	3	4	5
Increased faculty time for getting feedback from students.	1	2	3	4	5
Increased faculty time to explore more information.	1	2	3	4	5
2. Concerns about Incentives					
Monetary compensation for adopting Web-based distance education.	1	2	3	4	5
Incentives for adopting Web-based distance education.	1	2	3	4	5
Recognition for adopting Web-based distance education.	1	2	3	4	5
Awards for adopting Web-based distance education.	1	2	3	4	5

Continues on Next Page →→→

Items (Cont')	NB	WB	MB	SB	VSB
7. Conflict with traditional education					
Competition with on-campus offerings or competition for existing students.	1	2	3	4	5
Disruption of the classroom's traditional social organization.	1	2	3	4	5
Traditional academic calendar/schedule hinders Web-based distance education.	1	2	3	4	5
Lack of person-to-person contact (i.e., lack of face-to-face interaction with students; difficulty building rapport with participants at a distance).	1	2	3	4	5
8. Technical expertise					
Lack of technical support.	1	2	3	4	5
Lack of training programs for Web-based distance education.	1	2	3	4	5
Lack of knowledge about Web-based distance Education.	1	2	3	4	5
Lack of the "right" people to implement web-based distance education.	1	2	3	4	5
9. Administrative support					
Lack of support or encouragement from Administrators.	1	2	3	4	5
Copyright/fair use issues in using materials in Web-based distance education.	1	2	3	4	5
Difficulty in recruiting faculty.	1	2	3	4	5
Difficulty in recruiting students.	1	2	3	4	5
10. Infrastructure					
Lack of adequate technology-enhanced classrooms/labs/infrastructure.	1	2	3	4	5
Lack of adequate student access to computer and Internet.	1	2	3	4	5
Lack of adequate instructor access to computer and Internet.	1	2	3	4	5
Lack of library access or delivery of materials and services.	1	2	3	4	5

Continues on Next Page →→→

Items (Cont')	NB	WB	MB	SB	VSB
3. Web-based distance education program credibility					
Concerns about evaluation of students' work.	1	2	3	4	5
Concerns about testing of students' work.	1	2	3	4	5
Concern that Web-based distance education programs lower the quality of students who are admitted.	1	2	3	4	5
Concern that Web-based distance education programs lower the expectations for student learning.	1	2	3	4	5
4. Financial concerns					
Increased tuition and fee rates.	1	2	3	4	5
Increased payment for cost of technologies.	1	2	3	4	5
Sharing revenue with department or business units.	1	2	3	4	5
Lack of money to implement Web-based distance education programs.	1	2	3	4	5
5. Planning issues					
Lack of identified need (perceived or real) for Web-based distance education.	1	2	3	4	5
Lack of shared vision for the role of Web-based distance education in the organization.	1	2	3	4	5
Lack of strategic planning for Web-based distance education.	1	2	3	4	5
Lack of a champion for Web-based distance education in the departments within the university.	1	2	3	4	5
6. Fear of technology					
Threat to instructors' sense of competence and authority.	1	2	3	4	5
Belief that job security is threatened.	1	2	3	4	5
Concern for legal issues (e.g., computer crime, hackers, software piracy, copyright).	1	2	3	4	5
Increased isolation of instructors.	1	2	3	4	5
Continues on Next Page →→→					

PART IV: PERSONAL CHARACTERISITICS
Please indicate your responses to the following questions:

1. Which College are you from? ______________________________
2. What is your gender? _____Male _____Female
3. What is your age? _____Years
4. What is your highest degree earned? _____Bachelors
   _____Master's
   _____Doctoral
5. What is your academic rank? _____ Associate Professor
   _____ Professor
6. How many years did you teach at the University level? _____
7. Have you taught courses using distance education? _____yes _____no
   If yes, please indicate the type and duration of distance education programs have you used (select all appropriate).

   _____Web-based distance education program _____Years

   _____TV or radio broadcasting program _____Years

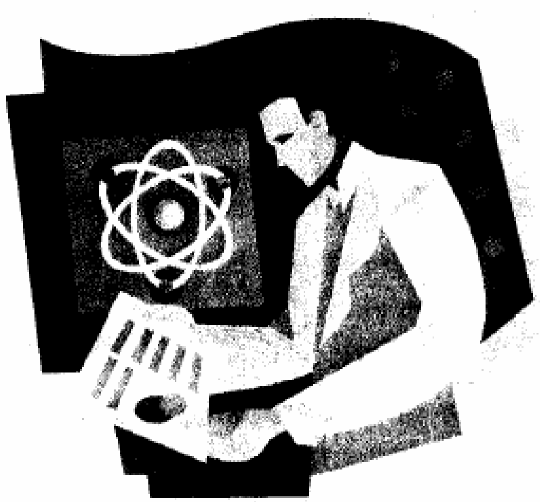
   _____Correspondence program _____Years

   _____Other (please list) ____________________ _____Years

In the space below, provide any additional comments you wish to share:

Please return the completed questionnaire in the prepared return envelope.
THANK YOU FOR YOUR TIME AND HELP!

影响网络教育项目扩散的因素分析：对中国农业大学教师群体的问卷调查



问卷内容

本次问卷调查是为了更好地了解中国农业大学教师群体对影响网络教育项目扩散的属性和障碍因素的认识。网络教育在此定义为一种以网络技术(电脑，因特网，多媒体技术等)为主要学习工具的教学形式，在这种教学中，教师和学生的教与学主要是通过网络工具来完成。

本次问卷共有四部分，在回答问题之前请阅读每部分的说明文字。所有问卷内容将严格保密，任何个人信息和回答不会被发表或泄露。问卷结果将以统计结果的形式做整体分析，为方便对有效问卷的统计，我们将对问卷做编码。

在本次问卷中收集的数据将作为我博士论文的一部分，它将花费您十分钟时间，请在2004年1月10日前将完成的问卷寄回，非常感谢您的参与。

如果您对本次问卷有任何疑义，请随时与我联系: yan_li@tamu.edu 或1-979-862-9207。再次感谢您宝贵的时间和积极的参与，您的贡献将有助于我们更好地研究网络教育项目在中国农业大学的传播。

诚挚的，

Yan Li

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第一部分: 基本观点陈述

1. 请选择您对以下陈述的态度（在相应的位置画√）:

有限的学生入学率，即高中毕业生接受高等教育的比例仍然比较低，仍是当今中国高校面临的一个大问题。

________ 我同意.

________ 我不同意.

________ 我不确定是否存在这个问题.

2. 请选择一个最能反映您当前对网络教育态度的陈述（在相应的陈述前面画√）。

	陈述
	我没有参加过网络教育项目，目前也没有计划参加此类项目。
	网络教育<u>可能是</u>一种能让更多的学生接受中国高等教育的好手段。
	网络教育<u>是</u>一种能让更多的学生接受中国高等教育的好手段。
	我知道网络教育的好处。 在不久的将来，我将在教学中尝试它。
	目前我正在参与网络教育项目，它让我能接触到许多原本被传统高等教育限制在外的学生。
	我参与网络教育项目已超过一个学期,并打算继续参与它。

第二部分: 对网络教育属性的认识

以下列举的是五种影响网络教育扩散的属性，请仔细阅读对每种属性的描述，然后决定在多大程度上您赞同该陈述。

请用以下的等级来表示您对陈述的认同程度:
（在相应的等级数字上画√）

1=强烈反对
2=反对
3=既不同意也不反对
4=同意
5=非常同意

1. 相对优势					
使用网络教育能接触更多学生。	1	2	3	4	5
使用网络教育能让教学有更灵活的时间安排。	1	2	3	4	5
使用网络教育能让教师接触更多教学资源。	1	2	3	4	5
提供网络教育比较经济。	1	2	3	4	5
2. 相容性					
网络教育技术对我来说是可以接触得到的。	1	2	3	4	5
使用网络教育技术对我来说是可以接受的。	1	2	3	4	5
网络教育使用的方法是我教学条件可以接受的。	1	2	3	4	5
网络教育技术对学生来说是可以接触到的。	1	2	3	4	5
3. 复杂性					
教师能比较容易地接触到网络教育技术。	1	2	3	4	5
教师能比较容易地学会网络教育技术。	1	2	3	4	5
教师能比较容易地理解到网络教育教学方法中不同于传统教学的地方。	1	2	3	4	5
教师能比较容易地调整适合网络教育的教学方法.	1	2	3	4	5

接下页 →→→

4. 可试验性					
在将一门课完全采用网络教学之前,我有机会尝试先将部分内容(一堂课或一个单元)放到网上教授。	1	2	3	4	5
我可以将现在教授的部分课程内容(例如，阅读材料，作业题)放到网上以辅助我课堂教学。	1	2	3	4	5
我可以将现在教学的部分功能 (例如，通报成绩，答疑)放到网上以辅助我课堂教学。	1	2	3	4	5
学生有机会尝试使用网络教育工具(连接因特网，下载和上传文件，在线观看课程录像，在线聊天等)。	1	2	3	4	5
5. 可观察性					
我知道有老师在用网络教学。	1	2	3	4	5
我在我们学校注意到一些网络教学活动。	1	2	3	4	5
我清楚网络教育的优点。	1	2	3	4	5
我清楚网络教育的缺陷。	1	2	3	4	5

接下页→→→

第三部分: 影响网络教育扩散的障碍因素

以下列举的是影响网络教育扩散的障碍因素，请仔细阅读对每种障碍因素的描述，然后决定在多大程度上您赞同该陈述。

请用以下的等级来表示您对陈述的认同程度:
（在相应的等级数字上画√）

1=不是障碍
2=是微弱障碍
3=是障碍
4=是大的障碍
5=是非常大的障碍

1. 时间的顾虑					
教师将花更多的时间在课程开发上。	1	2	3	4	5
教师将花更多的时间在与学生的在线交流上。	1	2	3	4	5
教师将花更多的时间在收集学生的反馈意见上。	1	2	3	4	5
教师将花更多的时间在搜索信息上。	1	2	3	4	5
2. 缺乏激励因素					
使用网络教育没有很好的经济补偿。	1	2	3	4	5
没有动因去使用网络教育。	1	2	3	4	5
使用网络教育不会得到很好的认可。	1	2	3	4	5
使用网络教育不会得到很好的奖励。	1	2	3	4	5
3. 网络教育项目的信誉顾虑					
缺乏对学生工作的正确评估。	1	2	3	4	5
缺乏对学生工作的正确测试方法。	1	2	3	4	5
网络教育项目将降低招生的质量。	1	2	3	4	5
网络教育项目将降低学生对学习的期望值。	1	2	3	4	5
4. 财政顾虑					
网络学生的学杂费比较高。	1	2	3	4	5
网络教育技术费用昂贵。	1	2	3	4	5
网络教育项目的收益将在学院和网络公司之间分配。	1	2	3	4	5
开展网络教育项目缺少足够资金。	1	2	3	4	5

接下页→→→

5. 缺乏计划					
没有发现对网络教育的需求(无论是当前的还是潜在的)。	1	2	3	4	5
学院里对网络教育的作用没有一个清晰的认识。	1	2	3	4	5
没有对网络教育做战略计划。	1	2	3	4	5
大学各院系里没有对网络教育做积极宣传。	1	2	3	4	5
6. 对技术的担心					
网络教育技术威胁教师传统的权威地位。	1	2	3	4	5
教师的岗位安全感受到威胁.	1	2	3	4	5
法律上的顾虑 (例如，计算机犯罪，网络黑客，软件私有权，版权)。	1	2	3	4	5
网络技术使教师觉得与学生有距离感。	1	2	3	4	5
7. 与传统教育相冲突					
网络教育与传统在校授课相竞争。	1	2	3	4	5
网络教育打破传统教学中原有的社会组织关系。	1	2	3	4	5
网络教育被传统教学的时间安排所束缚。	1	2	3	4	5
网络教育中缺乏面对面的交流(例如，缺乏师生面对面的答疑机会，缺乏与远程学生业余交流的机会)。	1	2	3	4	5

接下页→→→

请用以下的等级来表示您对陈述的认同程度:
（在相应的等级数字上画√）

1=不是障碍
2=是微弱障碍
3=是障碍
4=是大的障碍
5=是非常大的障碍

8. 技术障碍					
缺乏技术支持。	1	2	3	4	5
缺乏对网络教育的培训项目。	1	2	3	4	5
缺乏对网络教育的知识。	1	2	3	4	5
缺乏应用网络教育的人才。	1	2	3	4	5
9. 行政支持顾虑					
缺乏学校行政人员对网络教育的支持和鼓励。	1	2	3	4	5
网络教育中课件的版权保护没有保障。	1	2	3	4	5
招募网络教育的教师有困难。	1	2	3	4	5
招募接受网络教育的学生有困难。	1	2	3	4	5
10. 设施顾虑					
没有足够网络教育技术支持的教室。	1	2	3	4	5
学生没有足够的计算机上网机会。	1	2	3	4	5
教师没有足够的计算机上网机会。	1	2	3	4	5
没有足够的图书馆资源辅助教学。	1	2	3	4	5

接下页→→→

第四部分: 个人基本信息

请回答以下问题：

1. 您属于哪个学院? ______________________________

2. 性别: _____男 _____女

3. 年龄: ________________

4. 学历: _____学士 _____硕士 _____博士

5. 学术头衔: _____副教授 _____教授

6. 您在大学里的教龄? ______________________

7. 您是否参加过远程教育? _____是 _____否
   如果是，请在以下列举的远程教育项目中选择您曾参与过的项目，并填写您参加的时间长度(选择所有参与过的项目)。

   _____网络教育项目 _____年

   _____广播与电视节目 _____年

   _____函授项目 _____年

   _____其他 (请列举) __________ _____年

8. 请留下您宝贵的意见:

请尽快将您完成的问卷反馈给我们!
谢谢您宝贵的时间和帮助!

VITA

Yan Li

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September 1998 – June 2001

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