Barriers to Diffusion of Web-based Distance Education at China Agricultural University

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Abstract

The purpose of this descriptive study was to investigate barriers to diffusion of Web-based distance education (WBDE) as perceived by faculty at China Agricultural University (CAU). Random and stratified sampling procedures were used to select participants for the study (N = 300). Data were collected on a printed questionnaire that was hand-delivered. Results showed that respondents tended to perceive WBDE program credibility, administrative support, planning issues, technical expertise, financial concerns, concerns about time, concerns about incentives, infrastructure, conflict with traditional education, and fear of technology as moderate barriers to diffusion of WBDE. 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. Professional area and gender had no significant influence on faculty perceptions about nine of the ten barriers. They, however, had significant impacts on faculty perceptions about concerns about time as a barrier.

Keywords: Adoption, China, Diffusion, Distance Education, Higher Education, Web-based

Introduction

Recent educational reforms in China have resulted in increased opportunities for its citizens to acquire new competencies. Swanson, Chuang, and Yan (2003) noted that distance education has been used to help extension clients market their products. Shen and Jones (2005) noted that although numerous education reforms have taken place over the past several decades, additional reforms are needed to create "a cadre of well-qualified workers and managers in strategic rural location" (p. 27).

Web-based distance education (WBDE), as a state-of-the-art educational innovation, diffused rapidly world wide in the last decade. It was introduced into China Agricultural University (CAU) in 2001 and at the end of 2003, there were about 70 faculty and nine majors involved in the WBDE program. Studies about WBDE indicate that increased availability of distance education technologies and WBDE programs do not automatically result in effective adoption by educators and learners. This is due, in part, to the fact that teaching and learning in WBDE programs differs dramatically from that in a traditional classroom (the Boyer Commission, 1998, Wallhaus, 2000). Faculty resistance to distance education has been and remains a major barrier to the development and propagation of such programs and courses (Bower, 2001; Moore, 1994).

The exploration of faculty perceptions about WBDE program, especially those barriers to diffusion of WBDE, is important because faculty are the core factor in the transformation from traditional education method to distance teaching methods (Moore & Kearsley, 1996; Olcott & Wright, 1995). As Miller and Shih (1999a) wrote that

> It is ultimately the faculty who will be responsible for delivering quality 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. (p. 55)

Theoretical Framework

The theoretical underpinnings of this study are based on Roger's (2003) Diffusion of Innovations model and bounded by Muilenburg and Berge's (2001) research on barriers to distance education. Muilenburg and Berge (2001) found the following ten barriers to distance education: "Administrative structure, organizational change, technical expertise, social interaction and quality, faculty compensation and time, threat of technology, legal issues, evaluation/effectiveness, access, and student-support services" (p. 7).

Other research on faculty perceptions about barriers to diffusion of WBDE have shown that faculty are concerned with lack of time, interactions between and among faculty and students, competencies to prepare and deliver curricular materials at a distance, poor recognition and reward systems, and lack of resources (Murphrey & Dooley, 2000; Wolcott, 1996; Rockwell, Schauer, Fritz, & Marx, 1999). Murphrey and Dooley (2000) identified several weaknesses and threats that faculty perceived to inhibit the adoption and diffusion of distance education technologies. These weaknesses and threats included administrative and institutional issues, financial issues, faculty support and recognition, technical support, poor communications, competition both internal and external to the institution, and copyright and intellectual property issues.

Rockwell et al. (1999) wrote that the lack of time and training were major obstacles inhibiting faculty adoption of WBDE. Carl (1991) wrote that faculty time and cost needed to develop and plan courses delivered at a distance varied greatly. Without policies in place, to insure faculty have appropriate release time or reallocation

of duties, faculty resistance to the development and delivery of distance courses will remain. Murphy and Terry (1998) concluded that college of agriculture faculty at one land grant university did not perceive appropriate rewards and recognition were in place to off set the additional time requirements necessary to develop and delivery online instruction.

External motivators such as compensation and recognition for distance educators have consistently been identified by faculty as inhibitors for potential adoption of WBDE (Edwards & Minich, 1998; Johnson & DeSpain, 2001). Inadequate compensation and recognition, however, may not be as important as intrinsic motivators in getting faculty involved in online education than extrinsic motivations (Dooley, Lindner, & Dooley, 2005; Rockwell et al., 1999). Dooley et al. (2005) recommended that faculty policies on both workload and rewards be clearly articulated.

According to Born and Miller (1999) lack of credibility of WBDE programs was perceived as a barrier by faculty that inhibited the adoption of such programs. Although the preponderance of research has shown little to no significant differences in learning outcomes between traditional on-campus students and distance learners (Russell, 2005, 1999), questions about overall quality and value of distance courses remains a concern (Miller & Shih, 1999a; Murphy, 1997; Olcott & Wright, 1995; Wolcott, 1996). Miller and Shih (1999b) stated that "faculty perceived off-campus courses to be less rigorous than on-campus courses" (p. 57). Ajayi (2001) reported that International Institute of Tropical Agriculture trainees' overall assessment of training did not differ by location of the training.

In China, access to and quality of technology was cited frequently as a barrier to diffusion of WBDE (Ding, 2002; Edwards, Zou, Cragg, & Song, 2000; Potter, 2003). Other barriers to the diffusion WBDE in China included management of learning centers, training of faculty, student retention and graduation rates (Potter, 2003), non-standardized teaching platforms, lack of standardized policies and procedures, lack of financial resources, limited technical support, student assessment techniques, and limited course offerings (Edwards et al., 2000).

Purpose

The purpose of this study was to investigate CAU faculty perceptions about barriers to diffusion of WBDE. Specific objectives were: To describe faculty according to their perceptions about barriers to diffusion of WBDE; and to examine the relationship between faculty members' personal characteristics and their perceptions about the ten barriers to diffusion of WBDE.

Methods

The research presented in this paper is part of a larger study being conducted to determine faculty perceptions about attributes and barriers impacting diffusion of Web-based distance education (WBDE) at the CAU (Li, 2004). An abstracted version of this paper appears in a Chinese language only Journal (Li & Lindner, 2005). Faculty at the CAU ($N = 1170$) were the target population for this study. Seventy faculty members at CAU were currently participating in WBDE courses and 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). The sample was stratified by randomly selecting 50 faculty involved in WBDE courses and programs and 250 faculty not involved in WBDE courses and programs. A usable response rate of 91% ($n = 273$) was obtained for the study. To control for nonresponse error, late responses (last 50% received) were compared to early responses (first 50% received) on faculty

perceptions about attributes of WBDE. No significant differences were found; therefore the results of this study can be generalized to the target population (Lindner, Murphy, & Briers, 2001). To assess the magnitude of statistical differences, effect sizes were calculated, interpreted, and reported using Cohen's (1988) convention.

The research instrument was based on Muilenburg and Berge's (2001) study and was designed to measure participants' perceptions about barriers to diffusion of WBDE. Barriers to the diffusion of WBDE used in the instrument 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 each of the ten barriers by responding to four statements on a five point summated scale. Content and face validity of the instrument was established by a panel of experts consisting of faculty (at both American and Chinese institutions of higher education) who have expertise in adoption/diffusion research. Reliability for the scales were estimated by calculated a Cronbach's alpha coefficient on pilot study data. Reliability for the scales ranged from .70 to .94.

Results

The first objective of the study was to describe faculty according to their perceptions about barriers to the diffusion of WBDE at CAU. Participants' perceptions about each of the ten possible barriers to diffusion of WBDE were measured by four statements. As Table 1 shows the overall means and standard deviations for the ten perceived barriers to diffusion of WBDE were: WBDE program credibility, $M = 3.14$ and $SD = 1.02$; administrative support, $M = 2.94$ and $SD = 0.84$; planning issues, $M = 2.90$ and $SD = 0.95$; technical expertise, $M = 2.88$ and $SD = 0.99$; financial concerns, $M = 2.87$ and $SD = 0.88$; concerns about time, $M = 2.84$ and $SD = 1.04$; concerns about incentives, $M = 2.75$ and $SD = 0.94$; infrastructure $M = 2.70$ and $SD = 0.96$; fear of technology, $M = 2.58$ and $SD = 0.91$; and conflict with traditional education, $M = 2.57$ and $SD = 0.93$. Faculty at the CAU tended to perceive all of the ten barriers as moderate barriers to diffusion of WBDE. Frequencies and percentages of faculty responses to questions on the summated scale that were used to calculate the Means and Standard Deviations are also presented.

Table 1

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

	No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
WBDE Program Credibility (*M* = 3.14, *SD* = 1.02, Moderate Barrier)										
Concerns about evaluation of students' work.	27	10.0	41	15.1	72	26.6	79	29.2	52	19.2
Concerns about testing of students' work.	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.	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.	42	15.5	57	21.0	75	27.7	57	21.0	40	14.8
Administrative Support (*M* = 2.94, *SD* = 0.84, Moderate Barrier)										
Copyright/fair use issues in using materials in Web-based distance education.	15	5.5	34	12.5	80	29.5	69	25.5	73	26.9
Lack of support or encouragement from Administrators.	35	12.9	53	19.6	93	34.3	60	22.1	30	11.1
Difficulty in recruiting faculty.	51	18.8	78	28.8	86	31.7	39	14.4	17	6.3
Difficulty in recruiting students.	54	19.9	79	29.2	83	30.6	33	12.2	22	8.1
Planning Issues (*M* = 2.90, *SD* = 0.95, Moderate Barrier)										
Lack of strategic planning for Web-based distance education.	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.	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.	52	19.2	52	19.2	86	31.7	59	21.8	22	8.1
Lack of identified need for Web-based distance education.	71	26.2	67	24.7	81	29.9	38	14.0	14	5.2
Technical Expertise (*M* = 2.88, *SD* = 0.99, Moderate Barrier)										
Lack of training programs for Web-based distance education.	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.	40	14.7	52	19.1	84	30.9	65	23.9	31	11.4
Lack of knowledge about Web-based distance Education.	43	15.8	75	27.6	84	30.9	51	18.8	19	7.0
Lack of technical support.	60	22.1	64	23.5	68	25.0	51	18.8	29	10.7

Table 1 (continued)

	No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Financial Concerns (*M* = 2.87, *SD* = 0.88, Moderate Barrier)										
Lack of money to implement Web-based distance education programs.	19	7.2	44	16.6	77	29.1	70	26.4	55	20.8
Increased payment for cost of technologies.	31	11.7	63	23.8	89	33.6	53	20.0	29	10.9
Sharing revenue with department or business units.	46	17.4	56	21.1	99	37.4	47	17.7	17	6.4
Increased tuition and fee rates.	70	26.4	73	27.5	78	29.4	27	10.2	17	6.4
Concerns about Time (*M* = 2.84, *SD* = 1.04, Moderate Barrier)										
Increased faculty time for on-line communication with students.	37	13.7	51	18.8	76	28.0	75	27.7	32	11.8
Increased faculty time commitment for course development.	53	19.6	51	18.8	72	26.6	59	21.8	36	13.3
Increased faculty time for getting feedback from students.	58	21.4	58	21.4	69	25.5	63	23.2	23	8.5
Increased faculty time to explore more information.	73	26.9	64	23.6	48	17.7	49	18.1	37	13.7
Concerns about Incentives (*M* = 2.75, *SD* = 0.94, Moderate Barrier)										
Monetary compensation for adopting Web-based distance education.	46	17.0	53	19.6	89	32.8	50	18.5	33	12.2
Incentives for adopting Web-based distance education.	45	16.7	64	23.7	96	35.6	45	16.7	20	7.4
Awards for adopting Web-based distance education.	63	23.2	52	19.2	81	29.9	52	19.2	23	8.5
Recognition for adopting Web-based distance education.	60	22.1	52	19.2	92	33.9	49	18.1	18	6.6
Infrastructure (*M* = 2.70, *SD* = 0.96, Moderate Barrier)										
Lack of adequate student access to computer and Internet.	39	14.3	56	20.5	76	27.8	58	21.2	44	16.1
Lack of adequate technology-enhanced classrooms/labs/infrastructure.	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.	54	19.8	71	26.0	62	22.7	46	16.8	40	14.7
Lack of adequate instructor access to computer and Internet.	130	47.6	62	22.7	42	15.4	27	9.9	12	4.4

Table 1 (continued)

	No Barrier		Weak Barrier		Moderate Barrier		Strong Barrier		Very Strong Barrier	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Conflict with Traditional Education (*M* = 2.58, *SD* = 0.91, Moderate Barrier)										
Lack of person-to-person contact (i.e., lack of face-to-face interaction with students; difficulty building rapport with participants at a distance).	29	10.6	30	11.0	69	25.3	61	22.3	84	30.8
Disruption of the classroom's traditional social organization.	92	33.7	67	24.5	60	22.0	38	13.9	16	5.9
Traditional academic calendar/schedule hinders Web-based distance education.	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.	100	36.6	74	27.1	63	23.1	24	8.8	12	4.4
Fear of Technology (*M* = 2.57, *SD* = 0.93, Moderate Barrier)										
Increased isolation of instructors.	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).	41	15.0	55	20.1	83	30.4	51	18.7	43	15.8
Threat to instructors' sense of competence and authority.	121	44.3	66	24.2	50	18.3	24	8.8	12	4.4
Belief that job security is threatened.	122	44.7	67	24.5	50	18.3	25	9.2	9	3.3

Note. Scale: 1 = No Barrier, 2 = Weak Barrier, 3 = Moderate Barrier, 4 = Strong Barrier, 5 = Very Strong Barrier; Actual *N* responding varied due to item nonresponse

The second objective of the study was to examine relationships between faculties' personal characteristics and their perceptions about barriers to the diffusion of WBDE at CAU. CAU 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. Faculty from the College of Basic Science and Technology and College of Veterinary Medicine tended to perceive concerns about time as a weak barrier.

CAU faculty perceptions about the remaining nine barriers did not differ by professional area. CAU faculty perceptions about concerns about incentives as a barrier 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 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 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 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 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 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 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 did not differ by professional area, $F(11, 258) = 1.21$, $p > 0.05$. A small effect size ($f = 0.23$) was found. Perceptions on infrastructure as a barrier did not differ by 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 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 did not differ by distance education experience, $t(270) = 0.39$, $p > 0.05$. A negligible effect size ($d = 0.05$) was found.

Conclusions and Educational Importance

All of the listed ten barriers to diffusion of WBDE were perceived as moderate barriers by CAU faculty. WBDE program credibility was perceived by CAU faculty as the biggest concern. Concerns about incentives, infrastructure, conflict with traditional education, and fear of technology were seen as the least concern of the ten barriers. To ensure CAE's WBDE program is successful, in helping China to increase student access to higher education, information about barriers to its adoption and diffusion may help administrators and faculty to understand better how to modify and implement WBDE programs.

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 Munich's (1998), and Johnson & Despair's (2001) findings that faculty were 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.

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 CAU. Rogers (2003) identified that felt needs and innovativeness were crucial prior conditions for one's innovation adoption behavior. CAU 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.

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; Harrison, & Hardly, 2000; Kotrlik, Redman, & Murphy, 1997). 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.

The findings implicate that economic analysis are needed to study 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 help them make development strategy and allocate financial resources.

More time is needed for CAU faculty to develop online course and to communicate with distance students. Murphy (1997) 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 CAU.

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