# Factors Affecting Faculty Perceptions of Technologically Mediated Instruction: Competency, Value, and Educational Technology Support

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## Abstract

A survey of all teaching faculty members in the college of agriculture at a land grant university was conducted to describe their perceptions regarding their competence in using distance education technologies, the value they place on using distance education technology in teaching, and the level of information technology and support they believe exists in the college. Faculty members lacked confidence in their ability to use technology in their teaching, they perceived that technology is a valuable addition to the teaching and learning environment, and they believed the overall level of support for the use of technology in teaching is low. Tenure status and academic rank/position for tenure-track faculty were inversely related to overall distance education scores. Non-tenured Assistant Professors had the highest overall distance education scores and the highest competency scores.

## Introduction

Models of higher education are changing too rapidly for some people, and not rapidly enough for others. In 1998, according to an Association of University Technology Managers survey, 132 universities collected $576 million from patent royalties. Columbia University is one of many well-known institutions planning to move beyond the traditional nonprofit models and aggressively market the expertise of its faculty on a new for-profit website. Profits from knowledge on the new website will be split according to a formula between the school, the professor, and the professor's department. Most institutions already have these arrangements for profits from patents already, but no such arrangements existed for profits from teaching. Some faculty members worry that universities adopting teaching-for-profit models will provide additional support for profitable professors while detracting from those whose courses are less popular. Ann Kirschner, head of the Columbia University website project, said that Columbia would never do something to compromise the integrity of the school (Hayden, 2000).

Universities are and will remain a collection of faculty members. If, in fact, universities are to effectively implement new models of delivering instruction, then they will first convince faculty members to adopt them. This study investigates the factors affecting the adoption of the electronic technologies used to deliver instruction.

## Theoretical Framework

Research in the field of distance education has recognized the need for a change and modification of the faculty role in teaching at a distance (Wedemeyer, 1981; Beaudoin, 1990; Dillon and Walsh, 1992; Purdy and Wright, 1992). “It is not that the technology underpinning distance education drives the system, but rather that fundamental changes in teaching style, technique, and motivation must take place to make the new 'classrooms' of the present and future function effectively” (Purdy & Wright, 1992, p. 4). Many studies cite faculty resistance to instructional technology as a primary barrier to the continued growth of distance education programs (Gunawardena, 1990; McNeil, 1990). “Attitudinal issueshow people perceive and react to these technologiesare far more important now than structural and technical obstacles in influencing the use of technology in higher education” (McNeil, 1990, p. 2).

Other barriers stem from the lack of perceived institutional support (faculty rewards, incentives, training, etc.) for course conversion to distance education formats (Dillon and Walsh, 1992; McNeil, 1990; Wolcott, 1997; Olcott and Wright, 1995). “The accelerated development of distance education programs across American higher education will require a renewed commitment to its most important resource….faculty” (Olcott and Wright, 1995, p. 5). Despite the fact that much of the literature in distance education discusses the importance of

faculty, this group has been largely neglected by the research (Dillon and Walsh, 1992; Beaudoin, 1990).

In the Dillon and Walsh (1992) meta-analysis of studies examining faculty attitudes toward distance teaching, only one study examined issues of faculty members who did not offer one or more courses via distance education. These researchers wanted to capture the perceptions of the entire teaching faculty of the College of Agriculture regarding the instructional use of the technologies often associated with distance education.

Dooley and Murphy (2000) found that faculty members lacked experience in teaching learners at a distance, and that while not high on either scale, they were much more confident in their technical competence than they were in their methodological/pedagogical ability to use modern technologies in their teaching. These authors further found that faculty perceived training and assistance in the use of instructional technologies to be less available than equipment and facilities. Additionally, faculty members who had not participated in distance education perceived the level of support as lower than those who had taught classes at a distance. The ability of an organization to adapt to these changes is influenced by the following: competence, or the knowledge, skills, and abilities of its staff; value, or the amount of importance the staff places on the role of these technologies to accomplish teaching and learning; information technology support, or the availability of high quality facilities, equipment, technical support, and training (Dooley and Murphy, 2000). Little is known, however, about how these factors affect faculty adoption of distance education.

## Purpose and Objectives

The purpose of this study was to describe the teaching faculty in a college of agriculture at a land grant university and their perceptions regarding their distance education competence, the value they place on these technologies, and the amount of information technology support they perceive to be available. Specifically, the objectives of the study were:

1. To examine differences by an overall distance education score and personal characteristics;
2. To examine differences by distance education competency score and personal characteristics;
3. To examine differences by distance education value score and personal characteristics; and
4. To examine differences by distance education information technology and support score and personal characteristics.

## Methods and Procedures

The population for this study was all teaching faculty in the College of Agriculture at Texas A&M University. Department heads were asked to provide a complete listing of faculty members in their department who held teaching appointments. With all departments reporting, department heads identified a total of 331 faculty members with teaching appointments to be included in the initial sample. Sixteen of these faculty members subsequently provided documentation that they did not posses teaching appointments. The population of teaching faculty numbered 315.

Of the 315 survey instruments mailed, 196 were returned within two weeks, for an effective initial response rate of 62.2%. After three weeks, a reminder letter was sent to non-respondents along with a second copy of the survey instrument. A follow up e-mail reminder was sent to non-respondents four weeks after the initial mailing. Those non-responding teaching faculty without valid e-mail addresses were contacted via telephone. All non-respondents were contacted via telephone six weeks after the initial mailing, in some cases at home. In each case, they were encouraged to complete the survey and additional instruments were supplied upon request. In all, 263 survey instruments were returned for a final response rate of 83.5%. Survey and follow-up procedures were in accordance with those outlined by Dillman (1978).

The instrument used to collect data was a two-part questionnaire designed by the researchers. The instrument was four pages long and was designed to be automatically scanned into a digital file by an optical character recognition (OCR) scanner. Part I of the questionnaire was designed to identify the selected personal and professional characteristics of the respondents and describe their current level of involvement in technology-mediated instruction. Six questions were devoted to demographic variables. Those included were gender, age, the number of courses the faculty member taught per year, the number of years the faculty member had been teaching, the tenure status of the faculty member (Non-Tenure Track, Tenure Track, Tenured), and their academic rank or title (Instructor, Lecturer, Assistant Professor, Associate Professor, Professor).

Part II consisted of 28 statements designed to measure the distance education constructs of competence, value, and information technology and support. Competence refers to the eleven items on the questionnaire used to measure the perceived level of competence that respondents possessed in the use of electronic technologies often associated with distance education. Value refers to the nine items used to measure value: that is, the importance of the role respondents believed these technologies have or will have to teaching agriculture. Information technology and support refers to the eight items used to measure the perceived availability of equipment, facilities, and

training to determine the extent to which the campus environment supported the use of technologically mediated instruction on- and off-campus.

A five-point Likert-type response scale was employed. The response choices were: 1 = "Strongly Disagree," 2 = "Disagree," 3 = "Neither Agree nor Disagree," 4 = "Agree," 5 = "Strongly Agree." The researchers considered the possibility that many of the faculty would not hold strong opinions on some statements due to a lack of information about, and or exposure to, these relatively new technologies. Reliability was established by calculating Cronbach's Alpha. The alpha for the 28 items in Part II of the questionnaire was .82: Competency Scale 11 items alpha .81; Nine item Value Scale alpha = .84; Information Technology and Support Scale, Eight items alpha = .74. A panel of five experts made up of faculty members from the Department of Agricultural Education, the Department of Educational Human Resource Development, and the Center for Distance Learning Research established content validity of the instrument. Selected faculty members from the colleges of Education and Liberal Arts completed a pilot test of the instrument. Minor changes in the instrument were made based upon evaluation of the pilot test and suggestions from the panel of experts.

## Findings

### *Objective 1*

An overall distance education score (88.6) was computed (see Table 1) by summing the distance education competency, value, and information technology and support scores. Summated scales are an appropriate method of combining several variables that measure the same concept into a single variable in an attempt to increase the reliability of the measurement. In most instances, the separate variables are summed and their total score is used in the analysis (Hair et al., 1998).

The lowest overall distance education score was 47 and the highest 128. Distance education competency scores ranged from 11 to 54. Distance education value scores ranged from 14 to 45. Distance education information technology and support scores ranged from 9 to 39.

As shown in Table 2 the Overall Distance Education Score for respondents was significantly related to the following: tenure, F (2, 250) = 4.86; and academic rank/title, F (3, 249) = 3.54. Non-tenured teachers had significantly higher overall distance education scores than tenured teachers. Assistant Professors had higher overall distance education scores than Instructors/Lecturers, Associate Professors, and Professors. The Overall Distance Education Score for teachers was not significantly related to gender, t (250) = -1.67; age, F (3, 249) = 1.47; teaching load, F (2, 250) = 0.00; and teaching experience F (4, 248) = .65.

**Table 1. Total Distance Education Score**

| Distance Education Scores | M | SD |
|---|---|---|
| Distance Education Competency Score | 32.0 | 8.3 |
| Distance Education Value Score | 33.2 | 5.7 |
| Distance Education Information Technology and Support Score | 23.4 | 5.7 |
| Total Distance Education Score | 88.6 | |

**Table 2. Overall Distance Education Score by Tenure and Academic Rank/Title**

| | n | M | SD | F |
|---|---|---|---|---|
| Tenure | | | | |
| Non-Tenure Track | 35 | 91.9 | 15.2 | 4.86* |
| Tenure Track | 51 | 92.7 | 14.1 | |
| Tenured | 167 | 86.7 | 13.5 | |
| Academic Rank/Title | | | | |
| Instructor/Lecturer | 18 | 89.6 | 17.0 | 3.54* |
| Assistant Professor | 48 | 94.2 | 13.6 | |
| Associate Professor | 38 | 85.8 | 13.3 | |
| Professor | 149 | 87.4 | 13.7 | |

Note: M=Overall Distance Education Score; *p<.05.

### *Objective 2*

In general, faculty members were not confident in their ability to incorporate these technologies into the learning environment. The Distance Education Competency Score for respondents was calculated by summing the 11 items in this scale. These results are summarized in Table 3.

Table 4 shows the Distance Education Competency Score for respondents was significantly related to the following: age, F (3, 249); tenure, F (2, 250) = 5.28; and academic rank/title, F (3, 249) = 6.82. Younger teachers had significantly higher distance education competency scores than older teachers. Non-tenured teachers had significantly higher distance education competency scores than tenured teachers. Assistant Professors had higher distance education competency scores than Instructors/Lecturers, Associate Professors, and Professors. The Distance Education Competency Score for teachers was not significantly related to gender, t (250) = -1.07; teaching load, F (2, 250) = 0.28; and teaching experience F (4, 248) = 1.84.

### *Objective 3*

The Distance Education Value Score was calculated by summing each of the items in Table 5. As reported by Dooley and Murphy (2000), faculty members in general believe that the technologies associated with delivering instruction at a distance contribute in a positive way to the instructional

**Table 3. Agreement With Distance Education Competency Statements**

| Statement | Strongly Agree | | Agree | | Neutral | | Disagree | | Strongly Disagree | |
|---|---|---|---|---|---|---|---|---|---|---|
| Competence | f | % | f | % | f | % | f | % | f | % |
| I am comfortable creating my own WWW homepage | 34 | 13.4 | 43 | 17.0 | 34 | 13.4 | 76 | 30.0 | 66 | 26.1 |
| I am comfortable creating my own presentation graphics | 79 | 31.2 | 78 | 30.8 | 38 | 15.0 | 29 | 11.5 | 29 | 11.5 |
| I use email for almost all my correspondence | 112 | 44.3 | 100 | 39.5 | 25 | 9.9 | 10 | 4.0 | 6 | 2.4 |
| I send my most important and confidential documents through email | 19 | 7.6 | 54 | 21.5 | 55 | 21.9 | 73 | 29.1 | 50 | 19.9 |
| I am able to scan photographs into digital files | 77 | 30.4 | 74 | 29.2 | 30 | 11.9 | 39 | 15.4 | 33 | 13.0 |
| I am able to manipulate digital images using software | 58 | 22.9 | 57 | 22.5 | 30 | 11.9 | 59 | 23.3 | 49 | 19.4 |
| I am able to record and use sound in my presentations | 8 | 3.2 | 17 | 6.7 | 33 | 13.1 | 87 | 34.5 | 107 | 42.5 |
| I am familiar with the teaching methods appropriate for distance learning | 12 | 4.7 | 48 | 19.0 | 51 | 20.2 | 70 | 27.7 | 72 | 28.5 |
| I could confidently deliver my course over the web | 15 | 5.9 | 39 | 15.4 | 39 | 15.4 | 76 | 30.0 | 84 | 33.2 |
| I could confidently deliver my course over interactive videoconferencing | 17 | 6.7 | 54 | 21.3 | 42 | 16.6 | 73 | 28.9 | 67 | 26.5 |
| I am comfortable connecting a computer to output devices | 50 | 19.8 | 69 | 27.3 | 49 | 19.4 | 39 | 15.4 | 46 | 18.2 |
| Note: Scale 1 =Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree; Average Competency Score for Participants=32.0 | | | | | | | | | | |

**Table 4. Competency Score by Age, Tenure, and Academic Rank**

| | n | M | SD | F |
|---|---|---|---|---|
| Age | | | | |
| 40 Years or Younger | 59 | 34.3 | 8.0 | 4.12* |
| 41 to 50 Years | 83 | 33.0 | 7.8 | |
| 51 to 65 Years | 98 | 30.2 | 8.5 | |
| Older than 65 Years | 13 | 30.0 | 9.1 | |
| Tenure | | | | |
| Non-Tenure Track | 35 | 33.1 | 9.8 | 5.28* |
| Tenure Track | 51 | 35.0 | 7.9 | |
| Tenured | 167 | 30.8 | 7.9 | |
| Academic Rank/Title | | | | |
| Instructor/Lecturer | 18 | 30.7 | 9.7 | 6.82* |
| Assistant Professor | 48 | 36.7 | 7.8 | |
| Associate Professor | 38 | 30.0 | 6.4 | |
| Professor | 149 | 31.2 | 8.3 | |

Note: M=Summated 11 item-5 point Likert-type scale; 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree; *p<.05.

process. They further reported that faculty members believe these technologies will drastically alter how we teach over the next five years, but not what we teach.

As shown in Table 6, the Distance Education Value Score for respondents was significantly related to gender, t (250) = -2.29. Female teachers tended to have higher distance education value scores than male teachers. The Distance Education Value Score for teachers was not significantly related to age, F (3, 249) = 0.85; teaching load, F (2, 250) = 0.08; teaching experience F (4, 248) = 0.77; tenure, F (2, 250) = 2.23; and academic rank/title, F (3, 249) = 1.17.

### *Objective 4*

As reported by Dooley and Murphy (2000), faculty members do not believe that there is enough support available to effectively utilize these technologies in teaching. The faculty perceived that the equipment to create and deliver technologically mediated instruction was more available than was assistance. The Distance Education Information Technology and Support Score was calculated by summing each of the items in Table 7.

**Table 5. Agreement with Distance Education Value Statements**

| Statement | Strongly Agree | | Agree | | Neutral | | Disagree | | Strongly Disagree | |
|---|---|---|---|---|---|---|---|---|---|---|
| Value | f | % | f | % | f | % | f | % | f | % |
| The Internet is a convenient ways to access information | 140 | 55.3 | 95 | 37.5 | 13 | 5.1 | 5 | 2.0 | 0 | 0.0 |
| Participation in listservs, discussion groups, chats, etc. offers great benefits | 40 | 15.8 | 82 | 32.4 | 94 | 37.2 | 26 | 10.3 | 11 | 4.3 |
| Electronic communications and information will drastically alter HOW we teach in the next five years | 81 | 32.0 | 94 | 37.2 | 50 | 19.8 | 22 | 8.7 | 6 | 2.4 |
| Electronic communications and information will drastically alter WHAT we teach in the next five years | 27 | 10.7 | 48 | 19.0 | 61 | 24.1 | 86 | 34.0 | 31 | 12.3 |
| I think most course materials would be improved by incorporating multimedia | 47 | 18.7 | 100 | 39.7 | 72 | 28.6 | 24 | 9.5 | 9 | 3.6 |
| Animated graphics increase student interest and retention | 44 | 17.4 | 102 | 40.3 | 76 | 30.0 | 24 | 9.5 | 7 | 2.8 |
| Students today prefer a more visual learning experience | 48 | 19.0 | 119 | 47.0 | 75 | 29.6 | 8 | 3.2 | 3 | 1.2 |
| Electronic information technologies provide students with instantly available supplemental course and research materials | 64 | 25.3 | 137 | 54.2 | 41 | 16.2 | 9 | 3.6 | 2 | 0.8 |
| It is important that I incorporate electronic information technologies in the course(s) I teach | 48 | 19.0 | 105 | 41.5 | 59 | 23.3 | 27 | 10.7 | 14 | 5.5 |
| Note: Scale 1 =Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree; Average Value Score for Participants=33.2 | | | | | | | | | | |

The Distance Education Information Technology and Support Score for teachers was not significantly related to gender, t (250) = -0.26; age, F (3, 249) = 1.23; teaching load, F (2, 250) = 0.53; teaching experience F (4, 248) = 0.53; tenure, F (2, 250) = 1.06; and academic rank/title, F (3, 249) = 0.30. The distance education information technology and support score was computed by summating an 8 item-

5 point Likert-type scale designed to measure the construct.

**Table 6. Distance Education Value Score by Gender**

| Gender | n | M | SD | t |
|---|---|---|---|---|
| Male | 221 | 32.8 | 5.7 | -2.29* |
| Female | 31 | 35.4 | 6.0 | |

Note: M= Summated 9 item-5 point Likert-type scale; 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree; *p<.05.

## Conclusions and Implications

Based on the objectives of this study, the following conclusions were drawn and implications developed. Overall, tenure status and academic rank/position were inversely related to higher overall distance education scores. Non-tenured, Assistant Professors had the highest overall distance education scores and the highest distance education competency scores. It is likely those newer faculty members are being hired with the expectation of using technology in the classroom and they already possess high levels of self-efficacy and skill with technology integration. These new faculty are between the "Baby Boomers" and "Generation Xers." They are the MTV generation, having grown up with video games and computer technology. Just as the college students in American higher education are changing, so are the faculties that serve them. It is interesting to note that the faculty members who have the highest level of comfort and competence in this area are the ones most discouraged from participation due to current policies for promotion and tenure. This has implications for senior faculty and administrators who are making decisions regarding appropriate reward structures for tenure and promotion. The existing promotion and tenure process should be modified, or a structure outside of this process must be created, if institutions expect the faculty members to participate who are most able to implement distance education programs.

Female faculty members had the highest distance education value scores. Although the number of female faculty was significantly less than the male counterparts, the SPSS statistical package accommodated for this discrepancy. This is an area needing further research and exploration. Did female faculty, in general, value teaching more than male faculty, or could it be that "value" questions on the survey aroused higher scores from female respondents? Personal characteristics of teaching faculty were not related to distance education information technology and support scores. It appeared that this issue was fairly universal across rank and gender.

**Table 7. Agreement with Distance Education Information Technology and Support Statements**

| Statement | Strongly Agree | | Agree | | Neutral | | Disagree | | Strongly Disagree | |
|---|---|---|---|---|---|---|---|---|---|---|
| Information Technology and Support | f | % | f | % | f | % | f | % | f | % |
| The equipment needed to produce and display multimedia course materials is readily available to me. | 24 | 9.5 | 86 | 34.0 | 55 | 21.7 | 55 | 21.7 | 33 | 13.0 |
| I am aware of the necessary procedure to secure electronic presentation equipment for classroom use within the university | 29 | 11.5 | 106 | 41.9 | 47 | 18.6 | 51 | 20.2 | 20 | 7.9 |
| I have access to a classroom that is designed to support the use of multimedia teaching aides | 35 | 13.8 | 98 | 38.7 | 31 | 12.3 | 43 | 17.0 | 46 | 18.2 |
| There are ample opportunities to secure faulty development on using multimedia and videoconferencing equipment | 14 | 5.5 | 55 | 21.7 | 90 | 35.6 | 67 | 26.5 | 27 | 10.7 |
| There are enough faculty development workshops regarding videoconferencing | 16 | 6.3 | 54 | 21.3 | 114 | 45.1 | 43 | 17.0 | 26 | 10.3 |
| I have access to technical assistance when teaching at a distance | 29 | 11.5 | 46 | 18.3 | 103 | 40.9 | 42 | 16.7 | 32 | 12.7 |
| The time spent developing course materials is valued by my department | 19 | 7.5 | 55 | 21.7 | 72 | 28.5 | 50 | 19.8 | 57 | 22.5 |
| I am aware of the procedure, office, and personnel responsible for scheduling videoconferencing equipment | 20 | 7.9 | 42 | 16.6 | 45 | 17.8 | 73 | 28.9 | 73 | 28.9 |

Note: Scale 1 =Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree; Average Information Technology and Support Score for Participants=23.4

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