# A Five-Year Longitudinal Examination Of Faculty Needs Associated With Agricultural Distance Education

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## Abstract

This study was conducted by the same researcher on the same population of faculty members over a period of five years, and was designed to measure changes in the faculty members' perceptions of their needs related to the use of technology to deliver instruction both on- and off-campus. Survey research methods were employed. Response rates were above 80% in both cases, and Cronbach's Alpha for all items combined across both instruments was .81.

Gender was significantly different. The number of female faculty members grew 283% over this five-year period. Faculty members in 2000 perceived that they had gained competence in technological skills. However, faculty members in 1995 were more certain of their ability to use appropriate teaching methods in technologically mediated environments than were those in 2000. While faculty members have gained access to and knowledge about technology over the past five years, they have lost confidence in their ability to use it appropriately in an instructional environment.

Faculty members agreed that the Internet is a convenient way to access information, that the incorporation of multimedia would improve most course materials, that students today prefer a more visual learning experience, and that the incorporation of electronic information technologies in the courses they teach is important. They remain convinced, even more now than five years ago, that these technologies will drastically alter how we teach in the next five years. More than a quarter of the faculty members now believe that communications and information technologies will drastically alter what we teach in the next five years.

In 1995, the greatest perceived need of the faculty to improve their use of electronic technologies in the teaching and learning environment was access to technical resources (hardware and software). Five years later, the faculty's primary concern shifted to a need for training and technical support.

## Introduction and Theoretical Framework

Murphy and Terry (1995) conducted a study of faculty members' perceptions that might affect their adoption of the technologies often associated with distance education. The purpose of this research was "to provide baseline data and focus for the improvement of instruction in a college of agriculture through the utilization of electronic technologies used in teaching" (p. 2). As a term used in surveying, an established baseline is to be used for comparisons among measurements taken at a later date. According to Rogers (1995), the rate of adoption, that is, the amount of time that passes from knowledge of an innovation until the decision to adopt, varies among individuals. Rogers (1995)

describes many difficulties in conducting research in diffusion and adoption, not the least of which is that the diffusion process can take years, or even decades, and the one-shot survey research methods are ill-suited to adequately describe such long-term processes. The recommendation is to conduct long-term research focused on a particular innovation. This is such a study. The first stage in Rogers' (1995) model for the adoption of innovations is knowledge. This study measures the changes in knowledge that the authors believe are prerequisite to the adoption of distance education.

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; Dillion & Walsh, 1992; Purdy & Wright, 1992; Moore, 2000). "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). In a recent National Center of Education Statistics Report, "the support and adoption of distance education has led to the emergence of a number of policy issues," namely, equity of access; the cost of program development and implementation; accreditation and quality assurance; copyright and intellectual property rights; changes and challenges facing the role of faculty; and pressures on existing organizational structures and arrangements (U.S. Department of Education, 1999).

Many studies cite faculty resistance to instructional technology as a primary barrier to the continued growth of distance education programs (Gunawardena, 1990; McNeil, 1990; Schifter, 2000). "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). Other barriers stem from the lack of perceived institutional support (faculty rewards, incentives, training, etc.) for course conversion to distance education formats (Dillon & Walsh, 1992; McNeil, 1990; Olcott & Wright, 1995; Schifter, 2000; Wolcott, 1997) and the perceived increase in faculty workload as a result of using instructional technology (Visser, 2000). "The accelerated development of distance education programs across American higher education will require a renewed commitment to its most important resource . . . faculty" (Olcott & 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 & Walsh, 1992; Beaudoin, 1990). In the Dillon and Walsh (1992) metaanalysis of studies examining faculty attitudes toward distance teaching, only one examined issues of faculty members who did not offer one or more courses via distance education. The 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.

## Purpose and Objectives

The purpose of this study was to identify and analyze changes in College of Agriculture faculty over the past five years regarding their competence, the importance they ascribe to, and their perception

of the adequacy of the infrastructure to support the use of technologies for the improvement of instruction. The objectives were as follows.

1. Compare selected personal and professional characteristics of the teaching faculty of the college of agriculture at a land grant university in 1995 and 2000.
2. Compare the perceived level of competence that members of the teaching faculty of the college of agriculture have in the use of educational technologies in 1995 and 2000.
3. Compare the 1995 and 2000 levels of importance teaching faculty members assigned to these technologies and their effects on teaching and learning.
4. Compare the perceived quality of the infrastructure (equipment, facilities, and support) to support the 1995 and 2000 faculty members' use of these technologies.
5. Compare the 1995 and 2000 faculty members' suggestions for the improvement of instruction through the use of these technologies.

## Methods and Procedures

### Population

The population for this study was all teaching faculty in the college of agriculture at a land grant university with a research one classification. A census of the population was surveyed in both 1995 and 2000. In both cases, Department Heads were asked to provide a complete listing of faculty members in their department who held teaching appointments. With all departments reporting, a total of 314 faculty members with teaching appointments were identified in 1994-95. The 1999-2000 population of teaching faculty, identified by the Department Heads, numbered 315. Inferences were drawn to this population. The reader may want to draw inferences to other similar populations, but is cautioned against drawing inferences to populations from institutions significantly different than this one.

### Instrumentation

The instrument used to collect data in the 1994-95 study (Murphy & Terry, 1995) was a three-part questionnaire that employed a seven-point Likert-type response scale. The instrument used in the 1999-2000 study (Dooley & Murphy, 2000) used a five-point Likert-type response scale. The 1994-95 items were collapsed in this manner (1=1; 2+3=2; 4=3; 5+6=4; 7=5). Questions used on the 1995 study were replicated exactly on the 2000 study when possible. Some questions involving particular technologies were changed to better reflect current terminology.

Part I of both questionnaires was designed to identify the selected personal and professional characteristics of the respondents. The demographic variables included in both survey instruments were gender, age, and the number of undergraduate and graduate courses the faculty member taught per year.

Items in Part II were designed to measure the following:

- level of competence of faculty members in the utilization of technologies associated with distance education;
- perceived value or importance these technologies have or will have to the teaching of agriculture;
- perceived quality of infrastructure, described as the availability of equipment, facilities, and training related to the use of these technologies.

Part III provided an opportunity for the respondents to add their comments concerning the improvement of their use of distance education technologies. This part of the questionnaire consisted of a single open-ended question, identical on both instruments: "In your own words, what would significantly improve your use of the new electronic educational technologies often associated with distance education?"

Content validity of the instruments was established by 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. A pilot test of the instrument was completed by selected faculty members. Minor changes in the instrument were made based upon evaluation of the pilot test and suggestions of the panel of experts.

Collection of Data

In both studies (Murphy & Terry, 1995; Dooley & Murphy, 2000), a census of the teaching faculty population was sent a copy of the questionnaire along with a cover letter describing the project via campus mail. Of the 314 survey instruments sent in the 1994-95 study, 256 were returned for a final response rate of 81.5%. In 1999-2000, 263 of 315 survey instruments were returned for a final response rate of 83.5%. The relatively high response rate was attributed in both cases to rigorous survey and follow-up procedures in accordance with those outlined by Dillman (1978).

Quantitative Analysis of Data

Data were analyzed using SPSS® 9.0 for Windows. Descriptive statistics were calculated for each variable. Early and late respondents were compared as suggested by Miller and Smith (1983). No significant differences were found between the groups in either the 1995 or the 2000 study. Reliability was established by calculating Cronbach's Alpha. These reliability estimates for each of the instruments were reported in the 1995 and the 2000 studies. The Cronbach's Alpha for all items combined across both instruments was .81.

The researchers realized that the study would be enhanced by paired analysis, but because of the anonymous nature of the 1995 survey instrument, it was not possible to match survey responses from the 1995 survey to the 2000 responses. SPSS was used to generate Crosstabs. Cell frequencies and percentages were used to summarize agreement or disagreement with statements related to competence, importance, and quality of infrastructure. Spearman's correlation coefficient, Rho, was used to determine if the faculty members' responses were statistically different. Spearman's Rho is a measure of association between data organized in rank order. Only those respondents who indicated

"agree" and "strongly agree" or those indicating "disagree" or "strongly disagree" are reported in the findings. Thus, those respondents who indicated "somewhat agree," "neither agree nor disagree," or "somewhat disagree" were considered not to have a strong opinion about a given statement.

Qualitative Analysis of Data

The constant comparative method was used for the open-ended qualitative data analysis (Lincoln & Guba, 1985). This method described four stages: 1) comparing incidents applicable to each category, 2) integrating categories and their properties, 3) delimiting the construction, and 4) writing the construction. For the first stage, the researchers studied the open-ended responses to determine trends in the data. Each idea (unit) was initially listed, without placement into categories. The investigators drew upon tacit knowledge in making these initial judgments for early category formulation. Colored markers were used to differentiate respondent themes so that the data would remain in context and provide visual indications of emerging categories. As the data analysis progressed, the researchers combined and more specifically defined categories based on overlying themes in the data. Once the categories emerged, fewer modifications were required as more data were processed. Delimiting the construction occurred as the data sources became saturated and the categories were integrated.

## Results

Part I: Personal and Professional Characteristics of Teaching Faculty

Gender was significantly different (Spearman Rho = .146; p = .001). In 1995, 12 (4.7%) of the respondents were female, while in 2000 34 (13%) were female. Age was not statistically different. Fewer than a quarter (24.1%) of those responding were younger than 40 years old and over 40% were over 51 years old. That age was not statistically different also implied that the data could not have been treated with a paired analysis. If in fact the data were paired, then the average age should have increased by five years. Teaching load was also statistically unchanged. Over three fourths (79.8%) of the teaching faculty report teaching fewer than three courses per year, with 31 (6%) reporting teaching no classes during the year.

Part II: Competence, Importance, and Quality of Infrastructure

Competence. Seven items on both questionnaires were used to compare the perceived level of competence that respondents from each sample had in the use of teaching using technologies often associated with distance education.

Faculty members in 2000 perceived that they had gained competence in technological skills. However, faculty members in 2000 were less certain of their ability to use appropriate teaching methods in technologically mediated environments that were those in 1995. All seven items were significantly different statistically. Items indicating competence had positive correlations from 1995 to 2000 while items indicating methodological competence had negative correlations. The correlations are summarized in Table 1.

To illustrate, respondents were significantly different in their response to the statement, "I am comfortable creating my own presentation graphics." As depicted in Figure 1, faculty members in 2000 were much more likely to agree or even strongly agree. Comparatively, respondents were significantly different, in the opposite direction, in their response to the statement, "I am familiar with the teaching methods appropriate for distance learning." As depicted in Figure 2, faculty members in 2000 were much more likely to disagree or even strongly disagree with this statement.

Faculty members had much more confidence in their technical competence than they did in their methodological ability to use these technologies in their teaching. In both cases, significant numbers of the respondents (55.6% in 2000 and 30.1% in 1995) disagreed or strongly disagreed with the statement, "I am familiar with the teaching methods appropriate for distance learning."

Table 1

Differences in Levels of Competence

| Statement | Spearman Rho | Asymp. Std. Error | Approx. T | Approx. Sig. |
|---|---|---|---|---|
| I am comfortable creating my own presentation graphics. | .329 | .041 | 7.897 | .000* |
| I use e-mail for almost all my correspondence. | .569 | .033 | 15.687 | .000* |
| I send my most important and confidential documents through e-mail. | .288 | .041 | 6.802 | .000* |
| I am able to scan photographs into digital files. | .183 | .045 | 4.226 | .000* |
| I am able to manipulate digital images using software like Photoshop. | .190 | .043 | 4.397 | .000* |
| I am familiar with the teaching methods appropriate for distance learning. | -.135 | .045 | -3.102 | .002* |
| I could confidently deliver my course on TTVN. | -.085 | .045 | -1.928 | .054 |

Significant at $\alpha$ .05

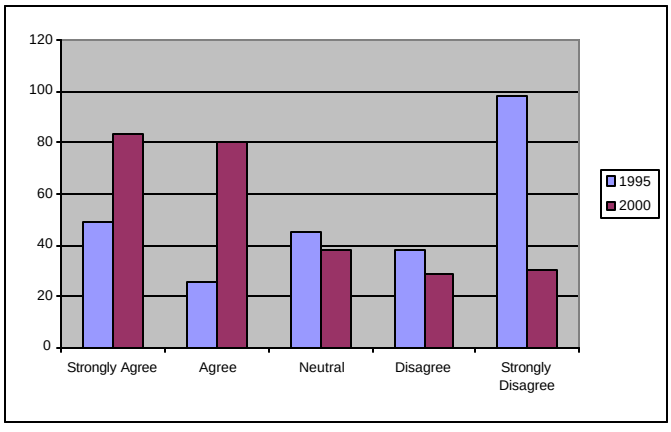


Figure 1: Use of Presentation Graphics

Importance. Nine items on both questionnaires were used to compare the perceived importance of the role respondents believed these technologies have or will have to teaching agriculture. All but one of these items were statistically significant. The Spearman Rho correlations are reported in Table 2.

Faculty members have changed their mind about the statement, "The Internet/WWW are convenient ways to access information." In 2000, they overwhelmingly agree or even strongly agree with the statement (45.3% in 1995 and 92.7% in 2000). While not statistically significant, nearly a third (30.5%) agreed or strongly agreed in 1995 with the statement, "Participation in listservs, threaded discussion groups, chats and other electronic communications offers great benefits," and more (48.3%) agreed or strongly agreed in 2000.

The respondents much more frequently agreed and strongly agreed (32.0% in 1995 and 58% in 2000) that most course materials could be improved by incorporating multimedia. They more frequently agreed and strongly agreed (32.0% in 1995 and 58% in 2000) that, "Animated graphics increase student interest and retention."

Almost exactly two-thirds (66.1%) of the respondents in 2000 agreed or strongly agreed that, "Students today prefer a more visual learning experience," whereas that number in 1995 was 20.3%. Over three-quarters (80.3%) of those responding in 2000 agreed or strongly agreed that, "Electronic information technologies provide students with instantly available supplemental course and research materials," while 57.4% shared that perception in 1995. Over one-half (60.8%) of 2000 respondents agreed or strongly agreed that, "It is important that I incorporate electronic information technologies in the courses I teach," while fewer than a third (30.0) shared that perception in 1995. The correlations are summarized in Table 2.

Faculty opinions have changed concerning the effect of these technologies. Many more faculty members (Spearman Rho = .120; $p = .006$) in 2000 share their colleagues' perception (53.9% Agree or Strongly agreed in 1995, and 69.9% Agree or Strongly agreed in 2000) that these technologies will drastically alter how we teach in the next five years. While not statistically significant, more respondents in 2000 also believe that communications and information technologies will drastically alter what we teach in the next five years (23.4% Agree or Strongly agree in 1995, and 30.0% Agree or Strongly agree in 2000).

Quality of Infrastructure. Eight items were used to compare the perceived availability of equipment, facilities, and training to determine the extent to which the campus environment had changed in its perception of the support available for the use of technologically mediated instruction on- and off-campus. All eight of these items were statistically significant. Moreover, in some cases the change was quite large. The correlations are summarized in Table 3.

In 1995, 5.1% agreed or strongly agreed that, "The equipment needed to produce and display multimedia course materials is readily available to me," in 2000 that number had grown to 42.2%. In 1995, 9.0% agreed or strongly agreed that they were aware of "the necessary procedure to secure

electronic presentation equipment for classroom use within the university," over the next five years the number had grown to 54.0%. In 1995, 9.4% agreed or strongly agreed that that they "have access to a classroom designed to support the use of multimedia teaching aids," by 2000 the number was 52.2%. While e-mail was almost ubiquitously available in campus offices in 1995 the number did grow from 83.2% to 91.6%. Much more change occurred at home. During this five-year period, the number of faculty members connected to e-mail at home grew from 18.4% to 71.9%.

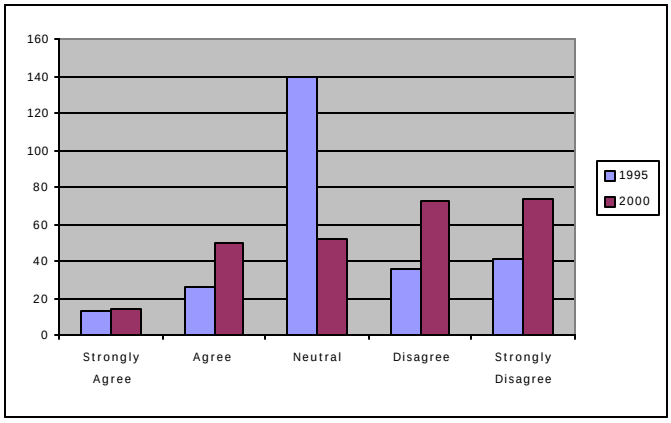


Figure 2: Teaching Methods

Table 2

Differences in Levels of Importance

| Statement | Spearman Rho | Asymp. Std. Error | Approx. T | Approx. Sig. |
|---|---|---|---|---|
| The Internet/WWW are convenient ways to access information. | .486 | .037 | 12.633 | .000* |
| Participation in listservs, threaded discussion groups, chats and other electronic communications offers great benefits. | .074 | .045 | 1.687 | .092 |
| Electronic communications and information will drastically alter HOW we teach in the next five years. | .120 | .044 | 2.743 | .006* |
| Electronic communications and information will drastically alter WHAT we teach in the next five years. | .010 | .044 | .221 | .825 |
| I think most course materials would be improved by incorporating multimedia. | .216 | .043 | 5.025 | .000* |
| Animated graphics increase student interest and retention. | .098 | .044 | 2.239 | .026* |
| Students today prefer a more visual learning experience. | .398 | .041 | 9.878 | .000* |
| Electronic information technologies provide students with instantly available supplemental course and research materials. | .180 | .044 | 4.160 | .000* |
| It is important that I incorporate electronic information technologies in the courses I teach. | .204 | .044 | 4.746 | .000* |

* Significant at $\alpha$ .05

Table 3

Differences in Levels of Quality of Infrastructure

| Statement | Spearman Rho | Asymp. Std. Error | Approx. T | Approx. Sig. |
|---|---|---|---|---|
| The equipment needed to produce and display multimedia course materials is readily available to me. | .273 | .047 | 6.461 | .000* |
| I am aware of the necessary procedure to secure electronic presentation equipment for classroom use within the university. | .402 | .039 | 9.974 | .000* |
| I have access to a classroom designed to support the use of multimedia teaching aids. | .364 | .040 | 8.872 | .000* |
| I am connected to e-mail and the WWW at my office. | .190 | .039 | 4.409 | .000* |
| I am connected to e-mail and the WWW at home. | .556 | .036 | 15.203 | .000* |
| There are ample opportunities to secure faculty development on using multimedia and videoconferencing equipment. | .111 | .044 | 2.534 | .012* |
| I have access to technical assistance when teaching at a distance. | .147 | .044 | 3.365 | .001* |
| The time spent developing course materials is valued by my department. | .088 | .045 | 1.997 | .046* |

* Significant at $\alpha$ .05

In general, training and assistance in the use of instructional technologies was less available than equipment. From 5.9% the number who agreed or strongly agreed "there are ample opportunities to secure faculty development on using multimedia and videoconferencing equipment" grew to 26.6%. In 1995, 4.7% of respondents agreed or strongly agreed, "I have access to technical assistance when teaching at a distance," by 2000 that number was 29.9%. While the progress is obvious, the departmental climate is not perceived as supportive of the use of these technologies. In 1995 just 5.5% of faculty agreed or strongly agreed that, "the time spent developing course materials is valued by my department," by 2000 that number was 28.3%.

Part III: Suggestions for Improvement

In 1995, when faculty were asked, "What would improve your use of electronic technologies in the future," five major categories emerged. Although the qualitative analysis is not intended to provide "frequencies," using color-coding allowed the researchers a visual depiction of the number of times a particular theme was mentioned. Therefore, the categories are listed in this order as an indication of perceived importance. Representative quotes are included to "define" the category in the words of the respondents.

1. Technical Resource Availability (Classroom hardware and software) – 64 times
   Representative Quotes: "Need a facility in the building with proximity to equipment;" "Building connected to rest of campus and world;" "Decent classroom/computer, software, and projecting devices."
2. Training and Technical Support – 57 times
   Representative Quotes: "I need the time and opportunity to learn—time to develop materials and supporting technical personnel;" "I'd like to have someone else to do it!" (2 "Need for more courses (workshops/training) on how to use it."
3. Philosophically Opposed/Not a Priority; Need "Proof" – 35 times
   Representative Quotes: "Nothing beats a professor lecturing using chalk;" "Educational programs should be based on 'near' rather than 'distance:'" "I am not convinced that is an effective tool and that I should do it."
4. Rewards/Incentives – 35 times
   Representative Quotes: "We need development leave time" and "release time to incorporate these technologies." Other rewards were "credit for intellectual property," "funding or incentive grants," and "tenure and promotion recognition."
5. Audience Base – 10 times
   Representative Quotes: "The demand or need is not immediately apparent." Although this was not a prevalent category, it is important to note that if the demand for distance education is not apparent, faculty perceive that it is not worth the time and effort (related to other categories above).

Faculty surveyed in 2000 expressed the same categories but with a shift in perceived importance.

1. Training and Technical Support – 85 times
   Representative Quotes: "The ability to take a detailed workshop that would make me feel comfortable teaching via distance education;" "Help in the technology and software components;" "Access to technical and multimedia support, increased logistical support (staff) for room scheduling."
2. Rewards and Incentives – 78 times
   Representative Quotes: "To have departmental encouragement and reward for doing it;" "There needs to be some incentive for faculty to spend time on distance education development;" "Having the time release from usual/existing responsibilities would be very helpful. Funds to hire experts to develop the necessary materials to implement such a class would be great, too."
3. Technical Resource Availability – 47 times
   Representative Quotes: "The frequent technical problems discourage me. I will try in 10 years when snags are worked out;" "Better classroom equipment. I still use overheads because using my computer is a pain!" "Computers and projection equipment permanently installed in the classroom for instructor use."

4. Philosophically Opposed/Not a Priority; Need "Proof" – 8 times
   Representative Quotes: "If I felt [electronic technologies] improved learning. I am not convinced 'visual entertainment' enhances learning;" "Seeing solid evidence that peer institutions are successfully adopting similar approaches and are maintaining their academic reputations;" "I must be convinced that distance education does not create an inferior product. I am very concerned that the teaching style necessary for electronic delivery would compromise the learning experience for off-site as well as on-site students. It seems that the present climate emphasizes accessibility over excellence."
5. Audience Base – 4 times
   Representative Quotes: "An audience that expresses a need and is willing to provide financial resources to justify allocation of faculty time to course and materials development;" "My use would be expanded if there was a demand for my course off-campus."

## Conclusions and Recommendations

The average teaching faculty member in this college of agriculture over the past five years was male and over forty years of age. He taught one to two undergraduate classes and one graduate class per year with an average annual enrollment of 120 students. Gender was found to be significantly different. While 34 of 263 is certainly not parity, 283% growth over five years is astonishing, and if maintained, would establish true numerical parity in less than 10 more years.

Faculty members in this college gained considerably in their competence in the use of electronic technologies. They would, in general, agree that they were competent in the use of these technologies. The same faculty, however, were less certain of their ability to use appropriate teaching methods in technologically mediated environments than they were in 1995. While a few more respondents reported that they were familiar with the appropriate teaching methods, many more disagreed and even strongly disagreed with the statement than in 1995. The authors contend that this may actually be a good thing. The first step to recovery is recognition of the problem, and many more faculty members recognized teaching methods as a lack in 2000 than in 1995. This new awareness may also have been affected by the recently expanded role the Department of Agricultural Education has taken in supporting faculty from across the college in the design and delivery of instruction.

This study found that teaching faculty members in the College of Agriculture considered the use of electronic technologies to enhance their teaching to be useful and important. Over 92% believe that the Internet and WWW are convenient ways to access information. They believed that these technologies would continue to have a substantial impact on teaching, changing how teaching is conducted within the next five years. A growing number of faculty members are coming to believe that these technologies will also change what we teach. The same technologies that enable us to change the way we do our job, improving the learning and teaching environments, are changing other fields as well. It was interesting to note that while the majority of faculty members agreed five years ago that these technologies would change how they taught, only a handful provided examples of ways their own teaching had been affected over the last five years.

While there is evidence of progress, teaching faculty members perceived training and assistance in the use of instructional technologies to be less available than equipment. Rogers (1995) describes that hardware is more quickly adopted because it is highly "observable." In the authors' own experience, there is often more administrative support for the purchase of equipment—possibly due to the highly observable nature of hardware. Resources should be redirected to helping faculty employ these newly purchased pieces of hardware in learning environments.

Based upon the qualitative analysis of faculty responses in 1995 and 2000, it is interesting to note that the same categories existed over time. Yet, the perceived importance of the categories shifted. In 1995, the greatest perceived need of the faculty to improve the use of electronic technologies was access to technical resources (classroom hardware and software). Closely related was the need for training and technical support on the use of these technologies. Many faculty were philosophically opposed to the idea of using these technologies in teaching, with a strong belief that teaching must occur through one-on-one contact. Although rewards and incentives were considered important, it appeared that the belief that technology would not be an effective teaching/learning tool took precedence over the consideration for rewards or incentives to promote faculty use of these technologies. Faculty did not see an apparent audience base for this type of instruction and therefore did not perceive the time and effort in technology integration to be worth it.

Five years later, the faculty's primary concern was for training and technical support. With significant university and college resources being dedicated to technological infrastructure, this is not surprising. Overall, faculty perceived that the technology is available but is a "hassle" to use or of poor quality. Faculty in the year 2000 have access to interactive video equipment and computer hardware and software, but lack the comfort level (competence) and time to attend workshops to learn how to use these technologies. This belief explains the importance of rewards and incentives to use technology. The faculty believed that if they had access to technical training and expertise (technical personnel) in addition to release time and recognition in promotion/tenure, then their use of electronic technologies would significantly improve. By the year 2000, fewer faculty member expressed philosophical opposition, although they continued to search for confimatory evidence that the use of these technologies will not diminish the teaching/learning experience. Faculty members in the year 2000 continued to seek an audience base to justify the additional time and resources necessary to convert courses into electronic formats.

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