The Use of Instructional Technology in Poultry Science Curricula in the United States and Canada: 2. Factors Contributing to the Use of Instructional Technology

J. G. Hogle,* G. M. Pesti,† J. M. King*

*Department of Instructional Technology, The University of Georgia, Athens, Georgia 30602-7144; and †Department of Poultry Science, The University of Georgia, Athens, Georgia 30602-2772.

ABSTRACT This paper describes a study conducted in recognition of the increasingly widespread use of computers and the importance of exposure to instructional technology (IT) in all aspects of the poultry science curriculum. The study consisted of the distribution and analysis of two cross-sectional surveys. One survey was sent to departments to obtain profiles of poultry science degree programs and the availability of IT and general support for its use. The second survey was sent to faculty to obtain individual profiles of IT use and of factors which may influence IT use.

Herein are reported the results and analysis of those factors that are thought to contribute to or limit the diffusion of these media among poultry science faculty. Analysis consisted of descriptive statistics and contingency table comparisons using Likelihood Ratio chi-square.

Factors that appear to be most important to faculty use of IT are availability of desired IT equipment, access to adequate expert assistance, availability of knowledgeable peers willing to share their experience and expertise, and exposure to concrete examples and ideas of how to use IT. All of these factors contribute to another important factor in participation and adoption: making it as easy as possible for faculty to learn and to use advanced IT methods.

(Key words: education, instructional technology, poultry science curricula, survey demographics, technology diffusion)

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INTRODUCTION

In 1987, the Poultry Science Association Teaching Committee noted that computer technology was widely used in the poultry industry and acknowledged that technology should impact the way in which poultry scientists are educated and trained (Sammelwitz, 1987). The committee recognized the importance of exposure to instructional technologies (IT) in all aspects of poultry science curricula. They requested information about the level at which computer applications existed among colleges and universities training poultry scientists and asked for recommendations based on those findings. Although some steps have been taken to survey which computer applications are taught in poultry science curricula (Waldroup, 1994), little information has been gathered on the use of technology in the development and delivery of instruction.

In an effort to answer the concerns of the teaching committee, a study was conducted of higher education programs in the US and Canada that offer poultry science courses. The study consisted of the distribution and analysis of two cross-sectional surveys. One survey was designed to obtain profiles of poultry science degree programs, availability of IT, and support for its use. The second survey was designed to obtain individual profiles of faculty use of IT and attitudes toward the use of such technologies. Analyses consisted of descriptive statistics and contingency table comparisons for factors suspected to influence adoption of technology.

Herein are the reported results of the factors that are thought to contribute to or limit the diffusion of these media among poultry science faculty. A cross-section of IT use and basic demographics of Poultry Science departments are presented in Hogle et al. (2000).

MATERIALS AND METHODS

Subjects

Faculty use of IT was investigated by mailing surveys to 263 faculty reported to teach at least one poultry science course. Recipients of the surveys were selected from the

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†To whom correspondence should be addressed: gpesti@uga.edu.

Abbreviation Key: IT = instructional technology.
Poultry Science Resource List (Reynnells and Newman, 1996). Selection criteria included faculty or instructors with teaching assignments in the field of poultry science. Listings in the Poultry Science Resource List include departments in the US, Puerto Rico, and Canada; thus, the surveys were limited to these regions. The faculty surveyed were from undergraduate 2- and 4-yr colleges, graduate programs, and professional studies such as colleges of veterinary medicine.

Survey Instruments

A description of the survey instruments was the same as outlined in Hogle et al. (2000). Subjects were asked about factors that may influence the use of technology in the development or delivery of instruction. These included questions about equipment, peer support, expert assistance, value of IT, training programs, and computer use at home. Factors thought to influence IT use were determined from previous studies and assumptions found in diffusion literature (Evans and Leppmann, 1967; Clark, 1992; Farquhar and Surry, 1994; Heath, 1996; Lediker, 1997; Sherry, 1997).

Procedure for Data Collection

Procedures for data collection were the same as outlined in Hogle et al. (2000).

Data Analysis and Presentation

Most of the data were presented as percentages and frequencies. When data were reported as percentages, values were rounded to whole numbers. When categories were compared by percentage of responses, percentages were usually calculated so that each category totaled 100%. Categories did not add to 100 when more than one answer was possible or when rounding error resulted in a slightly higher or lower total.

For each section of support factors, attitudes, and computer use, faculty were asked a two-part question. First, they were asked to what degree the support was available, usually in some form of none, some, or many. Second, they were asked whether the indicated support factor, or lack of it, influenced their use of technology in teaching. Comparisons of the factor and the reported influence on IT use were tested for significance using contingency tables calculated in JMP statistical software. Each comparison data set included a mosaic plot of compared responses and the results of a likelihood ratio chi-square test calculated from cross-tabs data in JMP. Notes included with Figure 1 describe how to read a mosaic plot.

The chi-square test indicates whether variables are independent of each other. The results, probability > chi-square, were reported as P-values. A P-value is reported as significant when P < 0.05, indicating that the compared variables are not independent and that some relationship or interaction exists between them. The P-values are reported in the body of associated figures.

RESULTS AND DISCUSSION

Although the factors influencing IT use in poultry science instruction appear to vary among individuals, most responses can be generalized into three categories. The influence of a factor may be 1) both positive and negative, 2) primarily negative, or 3) primarily positive.

When reviewing these results, one should note that the data are based on what faculty believe influences them in the use of IT. A discrepancy may exist between faculty perceptions and the actual influence of any of these factors.

Factors with Positive and Negative Influence on the Use of IT

Factors that have positive and negative influences on IT use generally inhibit use when the factor is absent or lacking and encourage use when present. For a significant
portion of the faculty surveyed, these factors include availability of IT equipment, availability of expert assistance, availability of knowledgeable peers, ideas of how to use IT, ease of learning IT, and use of a personal computer at work and at home.

Availability of IT Equipment. Faculty were asked whether they had adequate equipment to use technology as they would like in their teaching. The question did not ask about the sophistication of the desired equipment or how many forms of IT were available to them. It just asked whether the equipment desired for use in teaching was available. Nearly 90% reported that some or most of the IT equipment they want is provided.

Figure 1 illustrates how faculty estimated the influence of equipment availability on their use of technology in teaching. The responses were highly significant for negative influence when none or some of the equipment they want to use is available and were highly significant for positive influence when most of the equipment they want is available. Of those who have some of the equipment they desire, many felt this inhibited their use of IT. This question may have been read by respondents to mean, "only some of what I want."

Although faculty were not asked directly how they accessed IT equipment, department heads reported that most campuses provide computer labs and multimedia-equipped classrooms (Figure 2). Computer labs and equipped classrooms are most often supported at the college or campus level (75 to 80%), but at least half of departments reported supporting these facilities as well. Checkout or loan of IT equipment is less common at any level (40 to 60%).

Expert Assistance. Expert assistance is often available in the form of a specialist hired to manage a media or computer lab or as a group of individuals assigned to a media support department. Again, department heads reported that expert assistance is most often sponsored at the college or campus levels (Figure 3).

Figure 4 shows estimates of the influence of expert assistance on the use of IT. Responses were highly signifi-
most believe this inhibits their use of technology for teaching. When some assistance is available (about 60%), respondents are about evenly split in believing that this level of support inhibits use, encourages use, or has no influence on IT use. For the remainder, who report that good assistance is available to them, most report that it encourages their use of IT.

Peer Support. Knowledgeable peers are noted in the literature as being critical in bridging the gap between the early users of technology and the more cautious middle majority (Geoghegan, 1994; Rogers, 1995; Sherry, 1997). Generally, this is because it is easier for nonusers of a technology to see its potential when there are respected peers to look to for advice and assistance.

Survey respondents seem to agree strongly with the importance of peer support, and their estimate of peer influence on the use of IT is significant (Figure 4). Nearly 80% of respondents have few or many peers available who help others to learn about using new technology in teaching. Most faculty in this group report that having knowledgeable peers encourages their use of IT. Of those who report they have no peers who help them with new technology, a significant portion believes this inhibits their use of IT.

Ideas of How to Use IT. It makes sense that faculty who have ideas of how to use IT will be most likely to use it. As noted by a survey comment, “...It is often those of us who do not fully know what is available or what is possible that are most often out of the loop.”

Faculty and department heads responded similarly to the question of whether they feel they know how to use technology in the development and delivery of courses (Figure 5). Overall, about two-thirds of both groups reported that they have at least some idea of how IT can be used. About one-third reported they have many ideas and less than 10% admitted they have no idea how IT may be used.

As shown in the mosaic plot in Figure 6, faculty reporting that they have some ideas are fairly evenly split between believing that their knowledge encourages use or has no influence. As might be expected, the responses are highly significant in that having no idea of how to use IT is considered to inhibit use and having many ideas is considered to encourage use.

Age is highly significant with regard to ideas of how to use IT (Figure 6). Younger faculty (ages 31 to 50 yr) are more likely to have many ideas of how to use technology in the development and delivery of instruction. No one in the youngest (under 31 yr old) or oldest (over 60 yr old) age groups reported that they have many ideas about using IT. This response may be due to lack of teaching experience in the case of young faculty. In the case of faculty over 60 yr old, the lack of respondents reporting many ideas may be due to inexperience with computers and the Internet. Survey comments suggest that IT is considered by many to be limited to highly technical equipment and methods.

Ease of Learning IT. As might be expected, the ease of learning to use IT appears to be a highly significant factor in encouraging or inhibiting the use of technology in teaching. When respondents reported that learning
new technology is rarely easy for them (19%), they also reported that this inhibits their use of technology (Figure 7). Respondents who reported that learning to use technology is somewhat easy (37%) were about evenly split as to whether this encourages use or is no influence. Respondents who reported that learning IT is mostly easy (43%) also reported in most cases that this encourages their use of technology.

As was the case with having ideas of how to use IT, age again appears to be highly significant in reports of ease of learning. The number of faculty reporting that IT is mostly easy to learn decreases progressively as age increases. Conversely, the number of faculty reporting IT is somewhat or rarely easy to learn increases progressively as age increases (Figure 7).

**Use of Personal Computers at Work and Home.**

Nearly all respondents (99%) reported that they have access to their own computer in their workplace, and 94% actually use a computer in their workplace. Most (84%) believe that having access to a computer in their workplace encourages their use of technology for teaching.

A highly significant portion of respondents believe home computer use encourages their use of technology for teaching; 79% reported that they use a computer at home (Figure 8). One respondent remarked, “It is no longer possible to separate home use of a computer from ‘work’ use.” Another commented that for he and his wife, computers had become integral tools for their agricultural work—at home as well as on campus.

**Factors with Negative Influence on IT**

Factors that are primarily negative influences on IT use generally inhibit use when the factor is absent or lacking but are not regarded as a significant influence when present. For a significant portion of the faculty surveyed, these factors included reward for teaching efforts and available training and time to learn to use IT.

**Reward for Teaching Efforts.** Recognition for teaching efforts is often cited in the literature as an important factor in the use of instructional technologies (Evans and Leppmann, 1967; Burkman, 1987; Albright, 1996; Gentry and Csete, 1991; Hogle, 1999). This factor is reflected in
survey comments that stress the lack of reward for the extra learning and preparation needed to change or update teaching methods.

Overall, most respondents are unaware of any reward for teaching efforts (37%) or are rewarded less than they would like (39%). Only 9% reported that they are adequately rewarded for teaching efforts. Responses were significant for reward as an influence in the use of IT (Figure 9). Of those who are unaware of reward for teaching effort, lack of reward is considered noninfluential or inhibiting of IT use. Half of those who are rewarded less than they would like feel this does not influence their use of IT; the remainder is evenly split between feeling that inadequate reward inhibits or encourages use. Most of the “adequately rewarded” group believe reward is not an influence on their use of technology for teaching. Apparently reward for teaching is more important as an inhibiting factor when absent than as a motivating factor when provided.

**Available Training Programs and Time to Learn How to Use IT.** Learning a new technology or software program can be very time-consuming in the beginning stages of its use. Many survey comments noted the extensive time needed for learning to use IT, whether it was through personal efforts or in formal training programs. Accordingly, it would be expected that having time to learn to use IT would be a strong positive influence on use. However, when faculty reported that they do find the time to learn to use IT, responses were about even as to whether having time was no influence or encouraged IT use (Figure 9). This factor may be partly due to the wording of the question; finding time to use IT and feeling that time is readily available are not necessarily the same.

Responses were highly significant, however, for reports of negative influence from not having enough time to learn to use IT. About 50% of respondents reported that they do not have enough time to learn about using technology in teaching, and most believe this inhibits their use of IT.

Department surveys reported that training programs in the use of IT are available at most campuses. As with other IT-related support, training is most likely to be sponsored at the college or campus level (Figure 10). Nearly half of poultry science and animal science departments sponsor some type of training programs in IT use in addition to college or campus programs.

The unexpected modest response rate for time as a positive influence in the use of IT probably reflects that some faculty give it low priority. Survey comments indicate that faculty do not often choose to attend training programs even when they are available. These comments are in spite of those from many faculty that they prefer formal training in the use of equipment or software over learning on their own. Lack of participation in training programs is not necessarily due to lack of time but of inclination. As one respondent remarked, “I choose to spend my time on other tasks, and it usually does not occur to me to sign up for training.” Another commented, “I do not want to learn to do Web pages or to program. I want someone to take the info I provide and make it presentable.”
Factors with Positive Influence on IT Use

Factors that are primarily positive influences on IT use generally encourage use when present but do not appear to be a significant influence when absent or lacking. For a significant portion of the faculty surveyed, these factors include belief in benefits of IT, in general and for poultry science courses; pressure to use IT and Internet use at home; and use of a personal computer and the Internet by family members.

Belief in Benefits of IT. Negative influence from the lack of belief in IT benefits is difficult to determine from these data, as no one reported the belief that there are no benefits in using IT. Nearly two-thirds (61%) of respondents believe that technology can benefit teaching in some cases for teaching in general and for teaching poultry science courses in particular (Figure 11). Responses were highly significant for one-third of respondents, who believe technology can benefit teaching in most cases. Not surprisingly, most reported that having this belief encouraged their use of IT.

Pressure to Use IT. Unlike many attitudes and factors explored, pressure to use technology appears to be a neutral or positive factor in the use of IT. Few respondents describe feeling pressure to use IT as an inhibiting influence. A little more than half (52%) reported that they felt no pressure to use IT (Figure 12), but a highly significant portion of this group felt that this lack of pressure had no influence on their use of IT. Of the remainder who feel some or much pressure to use IT, a significant portion believe it encourages their use of IT.

Internet Use and Family Computer Use at Home. About two-thirds (70%) of respondents reported home access to the Internet (Figure 13), and a highly significant portion believe Internet use at home is a factor in their use of technology for teaching. It is not much of a surprise that most faculty who do not use the Internet at home believe this has no influence on their use of IT.

Some researchers have speculated that computer or Internet use at home by one family member influences the use of those technologies by other family members (Brouard, 1996). For faculty reporting that they have family who use computers or the Internet at home, responses were about evenly split as to whether family influenced their use of technology by encouraging IT use or had no influence at all (Figures 8 and 13). However, for faculty reporting no family computer or Internet use at home, responses were highly significant: none considered lack of family use to have any influence.

In summary, the data explored in this study reveal clues about some factors that influence the use of IT in poultry science education. Generalizations can be made about the positive or negative influence of support factors, but no simple formula exists for recommending the best use of IT or the best means of encouraging its use.

Factors that appear to be most important to faculty use of IT are making available the desired IT equipment, providing adequate expert assistance, encouraging knowledgeable peers to share their experience and expertise, and providing concrete examples and ideas of how to
FIGURE 13. Influence on the use of instructional technology (IT) by
the respondents use of the Internet at home and use of the Internet at
home by family members.

use IT. All of these factors contribute to another important
factor in participation and adoption: making it as easy as
possible for faculty to learn and to use.

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