Perspectives on the Future of Educational Technology

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This study was conducted to determine the opinions of a broad-based sample of educational technology professionals and students about the future of our field. A nationwide sample of 268 university personnel (faculty members, doctoral students, and master's students) and trainers completed a Likert-type survey that contained 30 items covering six topic areas: Educational Technology and Learning Theory, Instructional Design Models, Technology and Individualized Instruction, Advances in Technology, Educational Technology and Schools, and Employment and Job Opportunities. The overall results reveal that educational technologists have a positive outlook toward the future of our field. Opinions were most positive in the areas of Educational Technology and Learning Theory, Employment and Job Opportunities, and Technology and Individualized Instruction, and were least positive in the area of Advances in Technology. There were numerous significant differences of opinion on individual items across the four respondent groups, with the greatest number of differences occurring between faculty members and master's students.

□ Information about the future of educational technology is important for what we do today. It can help us determine the jobs for which we should train people, the system components and techniques for use in instruction and training, university curricula in educational technology, and the focus of our research.

Educational technology is a new discipline. We do not have a scientific basis for predicting its future well. The opinions of professionals in our field may be our best source of information about what the future holds for us.

Unfortunately, the existing literature does not provide a comprehensive and unbiased information base. Most articles and publications related to the future of educational technology deal primarily with only one or two areas, and collectively they do not provide broad coverage of the field. Moreover, these published works typically reflect the opinions of their author(s), who often are experts in a particular subject area and quite naturally tend to emphasize their own area and its importance to the field.

The present study was conducted to determine the opinions of a broad-based sample of educational technology professionals and students about the future of our field. Responses to the opinion survey used in the study yielded a measure of opinions across all respondents and a comparison of the opinions of university faculty members, doctoral students, master's students, and personnel employed in training positions.

A comprehensive sample for the study was obtained by surveying educational technology faculty and graduate students at ten universities, as well as individuals employed as training managers, trainers, and instructional designers at corporations and other agencies nationwide. The ten universities were selected because their educational technology programs are well known and because the universities provide a geographic balance nationally. Training personnel were selected from individuals known personally by the investigators and from those recommended by other trainers and by faculty at other universities.

The opinion survey used in the study covered six topic areas derived from analysis of recent literature in educational technology. Collectively the six areas and their accompanying items in the opinion survey provide broad general coverage of the field of educational technology. The six topic areas are listed below, accompanied by brief descriptions of their content and by references that were useful in deriving each area and/or formulating survey items for it.

- *Educational Technology and Learning Theory.* The influence of learning theory on educational technology and the influence of educational technology on learning theory (Ely, 1990; Gagné, 1986; Hannafin & Reiber, 1989; Winn, 1989).

- *Instructional Design Models.* The importance of improved instructional design models and the characteristics that will improve such models (Clark, 1989; Kerr, 1989; Merrill, Li, & Jones, 1990).

- *Technology and Individualized Instruction.* The influence of computer-based instruction (CBI) on individualization of instruction and the responsiveness of instructional systems to individual learners (Hannafin, 1992; Jonassen, 1991; Kinzie, 1990; Ross & Morrison, 1989).

- *Advances in Technology.* The degree to which computers and technology will assume roles of teachers in delivering instruction and of instructional designers in designing it (Butterfield & Nelson, 1989; Ely, 1990; Li & Merrill, 1991; Richards, 1989).

- *Educational Technology and Schools.* The role of educational technology in teacher education, school reform and restructuring, and the design and delivery of classroom instruction (Branson, 1990; Kerr, 1989; Reigeluth, 1989; Reiser & Salisbury, 1991).

- *Employment and Job Opportunities.* The need for personnel in educational technology, the major growth areas for employment, and the training emphases for graduate programs (Bratton, 1988; Reiser, 1988; Schwen, 1988).

METHOD

Sample

The final sample consisted of 268 respondents: 53 university faculty members, 85 doctoral students, 70 master's students, and 60 trainers. The return rate from trainers was 60 percent. The return rate for university personnel could not be determined due to the method of distributing and collecting the survey—i.e., through a faculty contact person at each university.

The ten universities participating in the study were Arizona State, Florida State, Georgia, Indiana, Memphis State, Minnesota, San Diego State, Syracuse, Penn State, and Utah State. These universities were intentionally selected to provide a sample that would be representative of very active programs in educational technology, rather than a sample representative of the entire AECT membership or of university and college programs generally. The majority of the trainers were employed by large international corporations, including American Express, Arthur Andersen, IBM, Intel, and Motorola.

Survey Measure

The 30-item survey of opinions on the future of educational technology was constructed to cover the six topic areas, with five items per area. The five items within a topic area were designed to provide general coverage of that area rather than to assess a single construct defined by the topic area.

Each survey item consisted of a statement about an aspect of educational technology accompanied by a 5-point Likert-type scale on which respondents indicated their level of agreement with the statement from strongly agree to strongly disagree. Items were randomly distributed throughout the survey rather than being formatted into the six topic areas. Respondents were directed to consider the reference period for the "future" to be the next two decades. All 30 survey items are listed by topic area in Tables 2 through 7 in the "Results" section of this article.

The pilot version of the survey consisted primarily of statements which were taken verbatim or nearly verbatim from journal articles, mostly from *Educational Technology Research and Development* (*ETR&D*), and which dealt directly with the future or had clear implications for it. The pilot version was administered to a total of approximately 80 faculty members and graduate students at Arizona State University and Florida State University. Data and suggestions from these respondents were then used to develop the final version of the survey. The data from the pilot version were used only for instrument development purposes and were not included in the final data set reported herein.

The revisions incorporated into the final version of the survey resulted in a broader-based measure that focused more on respondents' opinions about the future of educational technology than on their agreement or disagreement with statements in the literature per se. Revisions included adding items to the survey and modifying the wording of several items. The final version retained a strong basis in the literature because most of the statements on it were initially taken directly from the literature and subsequently either revised into their final form or used verbatim.

Procedures

One faculty member at each of the ten universities agreed to serve as a contact person to receive, distribute, collect, and return the copies of the survey at his or her university. The surveys and a set of directions were sent directly to each contact person, who subsequently returned the completed surveys in a single packet.

A total of 100 surveys were distributed to trainers. Most were sent individually, although multiple copies were sent to a few training personnel who had previously agreed to enlist the cooperation of other trainers at their workplace. Trainers returned their completed surveys individually in stamped return envelopes provided by the researchers.

Data Analysis

For each of the 30 survey items and six topic areas, mean scores were computed for faculty, doctoral students, master's students, trainers, and all respondents combined. Multivariate analysis of variance (MANOVA) was used to test for significant differences between the four respondent groups on the individual items within each topic area. The acceptable significance level was set at $p < .01$ because of the large overall number of comparisons. A Scheffé test was then performed for each item on which a significant difference was obtained to identify the groups that differed significantly from one another. MANOVA at $p < .01$ followed by a Scheffé test was also used to test for significant differences between universities on each item.

RESULTS

The results are reported below across topic areas, within each topic area, for individual items with the highest and lowest mean scores, and by university. The mean scores were derived by scoring responses on a 5-point Likert-type scale between 1, "strongly agree," and 5, "strongly disagree." The terms "agreement" and "level of agreement" are used below to refer to subjects' agreement with the statements in the survey, not to subjects' agreement with one another.

Mean Scores by Topic Area and Respondent Group

Table 1 shows the mean scores for each of the six topic areas and four respondent groups. The highest level of agreement with statements was in the area of Educational Technology and Learning Theory, with an overall mean of 2.26. Employment and Job Opportunities and Technology and Individualized Instruction were close behind, with mean scores of 2.29. The lowest level of agreement with statements was in the area of Advances in Technology, with an overall mean of 3.01. Mean scores by respondent group ranged from 2.34 for master's students (highest level of agreement with the statements) to a low of 2.62 for faculty (lowest level of agreement).

The meaning of the overall mean score for each topic area can be well understood only by examining the individual items within that area. The individual items and the mean scores for each item are reported below by topic area in the order of the overall mean scores for the six areas.

Mean Scores within Topic Areas

Educational Technology and Learning Theory

The mean scores for the Educational Technology and Learning Theory topic area are shown in Table 2. Respondents agreed most strongly (overall mean = 1.97) with the statement "Advances in learning theory will have an important influence on practices in educational technology." Respondents also showed general agreement with the ideas that educational technology will rely more on the field of human learning ($M = 2.15$); that instructional design models based on cognitive psychology will yield better long-term learning than those based on behavioral psychology ($M = 2.24$); and that research in educational technology will contribute to the development of learning theory ($M = 2.24$).

Table 2 reveals a consistent pattern for doctoral students (overall $M = 2.04$) and master's students ($M = 2.14$) to agree most strongly with the individual statements and for faculty members to show the least agreement with the statements ($M = 2.57$). The multivariate analysis of variance at $p < .01$ followed by Scheffé tests on the significant individual items revealed statistically significant differences between faculty members and both doctoral and master's students on three of the five items. Both doctoral students and master's students had significantly stronger agreement than faculty with statements regarding the influence of advances in learning theory on educational technology, the long-term learning benefits of cognitive design models over behavioral design models, and the role of educational technology research in the development of learning theory. The scores of trainers, which consistently were near the overall mean for the individual items in this topic area, did not differ significantly from those of the other three respondent groups.

Employment and Job Opportunities

Table 3 shows the mean scores for the Employment and Job Opportunities topic area.

TABLE 1 ☐ Mean Scores by Topic Area and Respondent Group (1 = Strongly Agree, 5 = Strongly Disagree)

Topic Area	*Faculty* (N = 53)	*Doctoral* (N = 85)	*Master's* (N = 70)	*Trainers* (N = 60)	*Overall* (N = 268)
Educational Technology and Learning Theory	2.57	2.04	2.14	2.28	2.26
Employment and Job Opportunities	2.26	2.37	2.26	2.25	2.29
Technology and Individualized Instruction	2.52	2.29	2.14	2.22	2.29
Educational Technology and Schools	2.53	2.60	2.32	2.21	2.42
Instructional Design Models	2.69	2.45	2.38	2.35	2.47
Advances in Technology	3.12	3.12	2.80	2.99	3.01
TOTALS	2.62	2.48	2.34	2.38	2.45

TABLE 2 □ Educational Technology and Learning Theory: Mean Scores

*Item Number**		*Faculty* (N = 53)	*Doctoral* (N = 85)	*Master's* (N= 70)	*Trainers* (N= 60)	*Overall* (N = 268)
9[a]	Advances in learning theory will have an important influence on practices in educational technology.	2.36	1.84	1.83	2.00	1.97
13	Educational technology will rely more on the field of human learning than it does now.	2.40	2.05	2.07	2.18	2.15
29[a]	Instructional design models based on cognitive psychology will yield better long-term learning than models based on behavioral psychology.	2.69	1.96	2.15	2.33	2.24
24[a]	Research in educational technology will play an increasing role in the development of learning theory.	2.70	2.06	2.07	2.32	2.24
18	Research in educational technology should focus more on variables related to cognitive processing and less on achievement per se.	2.71	2.29	2.59	2.58	2.52
	TOTALS	2.57	2.04	2.14	2.28	2.26

* The item number column shows the number of the item on the 30-item survey. A letter after the number denotes a statistically significant difference, which is described beneath the table for that item.

[a]Faculty are significantly different from doctoral and master's students.

Respondents showed strong agreement (overall $M = 1.81$) with the statement "There will be an increased need for personnel in educational technology." There also was general agreement with statements that training will be the major growth area for employment in our field ($M = 2.02$); that educational technology graduates should be more skilled in instructional design and development than in computers ($M = 2.20$); and that doctoral programs in the field should have a strong focus on preparing good researchers ($M = 2.20$). Respondents showed mild disagreement ($M = 3.25$) with the idea that graduate programs should focus more on preparing students for work in business and industry than in schools and universities.

Significant differences between groups occurred on two of the five Employment and Job Opportunities items. Faculty ($M = 1.77$) agreed significantly more strongly than master's students ($M = 2.37$) and trainers ($M = 2.58$) with the idea that doctoral programs should have a strong focus on preparing good researchers, and doctoral students ($M = 2.05$) agreed with this same item more strongly than trainers. Trainers, on the other hand, agreed more strongly ($M = 2.47$) than each of the other three groups with the statement that graduate programs should focus more on preparing students for work in business and industry than in schools and universities.

Technology and Individualized Instruction

Table 4 shows the mean scores for the Technology and Individualized Instruction topic area. Respondents showed relatively high overall agreement with statements that "Computer-based instruction will result in much greater individualization of instruction" ($M = 2.06$) and that "Computer-delivered instruction will benefit individual students by enabling them to manage their own learning to a greater extent" ($M = 2.08$). Master's students ($M = 1.81$) agreed significantly more strongly than faculty ($M = 2.31$) with the statement that CBI will result in much greater individualization. Both master's students ($M = 2.17$) and doctoral students ($M = 2.35$) agreed more strongly than faculty ($M = 2.90$) that educational technologists should be as concerned about increasing individualization of instruction as about increasing learner achievement.

Educational Technology and Schools

The mean agreement scores for the Educational Technology and Schools topic area are

TABLE 3 ☐ Employment and Job Opportunities

Item Number		Faculty (N = 53)	Doctoral (N = 85)	Master's (N= 70)	Trainers (N= 60)	Overall (N = 268)
19	There will be an increased need for personnel in educational technology during the next two decades.	1.83	1.90	1.72	1.75	1.81
2	The major growth area for employment of educational technologists will be in the training field.	2.06	2.02	1.91	2.08	2.02
27	Graduates of educational technology programs should be more skilled in the design and development of instructional programs than in the computer area.	2.00	2.25	2.15	2.35	2.20
23[a]	Doctoral programs in educational technology should have a strong focus on preparing good researchers.	1.77	2.05	2.37	2.58	2.20
12[b]	Graduate programs in educational technology should focus more on preparing students for work in business and industry than in schools and universities.	3.64	3.61	3.17	2.47	3.25
	TOTALS	2.26	2.37	2.26	2.25	2.29

[a]Master's students are significantly different from faculty; trainers are significantly different from faculty and doctoral students.
[b]Trainers are significantly different from faculty and doctoral and master's students.

TABLE 4 ☐ Technology and Individualized Instruction

Item Number		Faculty (N = 53)	Doctoral (N = 85)	Master's (N= 70)	Trainers (N= 60)	Overall (N = 268)
3[a]	Computer-based instructional programs will result in much greater individualization of instruction than we presently have.	2.31	2.18	1.81	1.95	2.06
30	Computer-delivered instruction will benefit individual students by enabling them to manage their own learning to a greater extent.	2.28	2.16	1.97	1.93	2.08
10	Instructional systems in the schools will be designed to be less group-based and more responsive to individual learners and learning styles.	2.60	2.26	2.29	2.32	2.35
15[b]	Educational technologists should be as concerned about increasing individualization of instruction (learner control over instruction, self-selected objectives and strategies, match of instruction to learner characteristics, etc.) as about increasing learner achievement.	2.90	2.35	2.17	2.50	2.45
25	Systematic instructional programs in education and training will involve individual learners more in selecting their own instructional objectives.	2.51	2.51	2.46	2.40	2.47
	TOTALS	2.52	2.29	2.14	2.22	2.29

[a]Faculty are significantly different from master's students.
[b]Faculty are significantly different from doctoral and master's students

TABLE 5 ☐ Educational Technology and Schools

Item Number		*Faculty* (N = 53)	*Doctoral* (N = 85)	*Master's* (N= 70)	*Trainers* (N= 60)	*Overall* (N = 268)
22	Educational technology will play an increasing role in teacher education programs.	2.15	1.93	1.90	1.90	1.96
1	Educational technology will play a major role in the reform and restructuring of the schools.	2.06	2.11	1.97	1.88	2.01
7[a]	The field of educational technology should make a strong effort to develop alternatives to the teacher-based model of public education.	2.40	2.85	2.43	1.95	2.45
17	Teachers will think of educational technology more as educational machines and software than as the systematic design of instruction.	2.68	2.99	2.68	2.75	2.79
26[b]	By the year 2010, more instruction in the schools will be delivered by computers and other media than by textbooks and teachers.	3.36	3.12	2.62	2.59	2.92
	TOTALS	2.53	2.60	2.32	2.21	2.42

[a]Doctoral students are significantly different from trainers.

[b]Faculty and doctoral students are significantly different from master's students and trainers.

shown in Table 5. Respondents had the highest agreement with the statements "Educational technology will play an increasing role in teacher education programs" (M = 1.96) and "Educational technology will play a major role in restructuring the schools" (M = 2.01). The lowest agreement with a statement, but still slightly above the "neutral or no opinion" level (M = 2.92), was for the statement "By the year 2010, more instruction in the schools will be delivered by computers and other media than by textbooks and teachers."

In the Educational Technology and Schools topic area, significant differences occurred on two items. Trainers (M = 1.95) showed significantly greater agreement than doctoral students (M = 2.85) with the statement "The field of educational technology should make a strong effort to develop alternatives to the teacher-based model of public education." Both trainers (M = 2.59) and master's students (M = 2.62) had significantly greater agreement than faculty (M = 3.36) and doctoral students (M = 3.12) with the statement "By the year 2010, more school instruction in the schools will be delivered by computers and other media than by textbooks and teachers."

Instructional Design Models

Table 6 shows the mean agreement levels for the Instructional Design Models topic area. Strongest overall agreement in this area was with the statement "Improving existing models of instructional design is an important goal for educational technology" (M = 2.07). Next strongest agreement was with the statement "Instructional design models can be improved more by incorporating steps that increase learners' personal control over instruction than steps that maintain or increase the instructional program's control over instruction" (M = 2.22). Lowest overall agreement was with the statement "Models of instructional design should focus at least as much on automated development of instructional programs by computer as on development of programs by instructional designers" (M = 3.11).

Significant differences between respondent groups were also obtained on two items in the Instructional Design Models area. Trainers (M = 2.00) agreed significantly more strongly than faculty members (M = 2.60) with the statement that increasing learners' personal control over instruction can yield greater improvement in

TABLE 6 ☐ Instructional Design Models

Item Number		*Faculty* (*N* = 53)	*Doctoral* (*N* = 85)	*Master's* (*N*= 70)	*Trainers* (*N*= 60)	*Overall* (*N* = 268)
14	Improving existing models of instructional design is an important goal for educational technology.	2.21	1.93	2.07	2.15	2.07
8[a]	Instructional design models can be improved more by incorporating steps that increase learners'personal control over instruction than steps that maintain or increase the instructional program's control over instruction.	2.60	2.21	2.13	2.00	2.22
20	Improved models of instructional design are likely to be more prescriptive (that is, provide more detailed guidance to designers) than our existing ones.	2.40	2.36	2.30	2.08	2.29
4	Improved models of instructional design will enable educational technologists to automate (by computer) much of the development of instructional programs.	2.85	2.52	2.53	2.56	2.60
28[b]	Models of instructional design should focus at least as much on automated development of instructional programs by computer as on development of programs by instructional designers.	3.40	3.25	2.87	2.95	3.11
	TOTALS	2.69	2.45	2.38	2.35	2.47

[a]Faculty are significantly different from trainers.
[b]Faculty are significantly different from master's students.

design models than increasing the instructional program's control. Master's students (*M* = 2.87) agreed more strongly than faculty (*M* = 3.40) that design models should focus as much on computer-based automated development of instructional programs as on development of programs by instructional designers.

Advances in Technology

Mean scores of the final topic area, Advances in Technology, are shown in Table 7. Respondents did not show strong agreement with any of the five statements in this area, with the highest overall mean at 2.67. Mean scores were below 3.00 for three of the five items: that technology-as-hardware will have a greater influence in education and training than technology as instructional systems design (*M* = 3.04); that the role of instructional designers will shift from designing instruction to creating systems that design it (*M* = 3.16); and that expert systems will design effective instructional sequences or programs with minimal human input (*M* = 3.40). A significant difference between groups was obtained only on this final item, with master's students (*M* = 3.01) showing stronger agreement than both doctoral students (*M* = 3.51) and faculty members (*M* = 3.64).

Items with Highest and Lowest Agreement

Table 8 shows the five statements from the 30-item survey with which the 268 respondents agreed most strongly and the five statements with which the respondents agreed least strongly. The table reveals that respondents showed the strongest agreement (*M* = 1.81) with the statement "There will be an increased need for personnel in educational technology in the next two decades," and the strongest disagreement (*M* = 3.40) with "Expert systems will design effective instructional sequences or programs with minimal human

TABLE 7 ☐ Advances in Technology

Item Number		*Faculty* (*N* = 53)	*Doctoral* (*N* = 85)	*Master's* (*N*= 70)	*Trainers* (*N*= 60)	*Overall* (*N* = 268)
21	Advances in the field of technology will enable the schools to deliver instruction effectively with much less direct involvement from the teacher.	2.57	2.89	2.46	2.70	2.67
16	Computer-delivered instruction will become capable of carrying out many of the human aspects of instruction.	2.94	2.87	2.54	2.73	2.77
5	Technology-as-hardware (i.e., computers, video cameras, etc.) will have a greater influence on education and training than technology as instructional systems design.	3.11	3.09	2.97	2.98	3.04
6	The role of instructional designers will shift from designing instruction to creating systems that design instruction.	3.32	3.24	3.01	3.07	3.16
11[a]	Expert systems will design effective instructional sequences or programs with minimal human input.	3.64	3.51	3.01	3.48	3.40
	TOTALS	3.12	3.12	2.80	2.99	3.01

[a]Faculty and doctoral students are significantly different from master's students.

TABLE 8 ☐ Items with Highest and Lowest Agreement

HIGHEST AGREEMENT		
Rank	*Item Statement*	*Mean*
1	There will be an increased need for personnel in educational technology during the next two decades.	1.81
2	Educational technology will play an increasing role in teacher education.	1.96
3	Advances in learning theory will have an important influence on practices in educational technology.	1.97
4	Educational technology will play a major role in the reform and restructuring of the schools.	2.01
5	The major growth area for employment of educational technologists will be in the training field.	2.02

LOWEST AGREEMENT		
Rank	*Item Statement*	*Mean*
26	Technology-as-hardware (i.e., computers, video cameras, etc.) will have a greater influence on education and training than technology as instructional systems design.	3.04
27	Models of instructional design should focus at least as much on automated development of instructional programs by computer as on development of programs by instructional designers.	3.11
28	The role of instructional designers will shift from designing instruction to creating systems that design instruction.	3.16
29	Graduate programs in educational technology should focus more on preparing students for work in business and industry than in schools and universities.	3.25
30	Expert systems will design effective instructional sequences or programs with minimal human input.	3.40

input." The mean agreement level ranged from 1.81 to 2.02 for the five highest-agreement items and from 3.04 to 3.40 for the five lowest-agreement items. Four of the five lowest-agreement items dealt with technology-as-hardware or with the use of computer or systems applications to design and develop instruction.

Mean Scores by Topic Area and University

Table 9 shows the mean scores by topic area for each of the ten universities that participated in the study. The highest level of overall agreement across all areas was from San Diego State (*M* = 2.25), followed by Georgia (*M* = 2.33) and Penn State (*M* = 2.35). The lowest agreement levels were from Arizona State and Memphis State, both with mean scores of 2.72.

Significant differences between universities occurred on only two of the 30 items. Respondents from Georgia (*M* = 2.00) showed significantly stronger agreement than those from Arizona State (*M* = 3.04) with the statement "Educational technologists should be as concerned about increasing individualization of instruction as about increasing learner achievement." Respondents from Syracuse (*M* = 1.80) agreed significantly more strongly than those from Arizona State (*M* = 3.00) with the statement "Instructional design models can be improved more by incorporating steps that increase learners' personal control over instruction than steps that maintain or increase the instructional program's control over instruction."

DISCUSSION

It is apparent from this study that educational technologists have positive opinions about the future of their field. They agreed most strongly of all with the idea that the need for personnel in their field will increase over the next two decades. They felt that educational technology will play important roles in teacher education and in the reform and restructuring of the schools. They also were optimistic that computer-based systems will result in more individualization of instruction and in greater learning benefits to individual students.

Distinct patterns of opinions occurred within each of the six topic areas. Responses in the Educational Technology and Learning Theory area revealed relatively strong opinions that advances in learning theory will influence educational technology and that

TABLE 9 ☐ Mean Scores by Topic Area and University

	Educational Technology & Learning Theory	*Employment & Job Opportunities*	*Technology & Individualized Instruction*	*Educational Technology & Schools*	*Instructional Design Models*	*Advances in Technology*	Totals
San Diego	2.03	2.13	2.11	2.29	2.26	2.70	2.25
Georgia	2.17	2.32	2.01	2.44	2.33	2.72	2.33
Penn State	1.95	2.34	2.17	2.24	2.35	3.04	2.35
Indiana	2.45	2.26	2.09	2.40	2.56	2.96	2.45
Minnesota	2.18	2.29	2.20	2.47	2.50	3.10	2.46
Syracuse	2.23	2.51	2.25	2.58	2.50	3.09	2.53
Utah State	2.52	2.33	2.68	2.62	2.31	3.00	2.58
Florida State	2.58	2.26	2.47	2.53	2.66	3.05	2.59
Arizona State	2.24	2.33	2.72	2.74	2.92	3.35	2.72
Memphis State	1.93	2.15	2.85	2.93	2.85	3.63	2.72
OVERALL	2.23	2.29	2.36	2.52	2.52	3.06	2.50

research in educational technology will influence the development of learning theory. The statement "Advances in learning theory will have an important influence on practices in educational technology" had the third highest overall agreement level among all 30 items on the survey. Faculty showed much less agreement than master's and doctoral students with statements about the increasing role of learning theory in educational technology.

The higher agreement by graduate students with statements in the Educational Technology and Learning Theory area may be due in part to a trend toward emphasizing learning theory and learning research more in educational technology graduate programs today than during the time when many faculty members were in graduate school. The lower faculty agreement is also consistent with responses of faculty members to many other items in this survey dealing with changes in our field.

Overall opinions were very positive in the Employment and Job Opportunities area, with the exception of responses to the statement that graduate programs should focus more on preparing students for work in business and industry than in schools and universities. The highest overall agreement with any item—indicating an increased need during the next two decades for personnel in educational technology—was from this topic area. Curiously, all four groups of respondents agreed quite strongly that our major growth area for employment will be in the training area, yet three of the four groups (trainers were the only exception) disagreed that graduate programs should focus more on preparing students for work in business and industry than in schools and universities. It seems more reasonable to conclude—as only the trainers did—that if training is to be our major growth area, it should receive relatively greater emphasis in our graduate programs.

Faculty agreed especially strongly with the statement that doctoral programs should prepare good researchers, whereas trainers showed significantly lower agreement with this idea than faculty members and doctoral students. It seems likely that this difference reflects the differing job expectations for faculty and training personnel. Faculty members often are expected to do research and publish it, whereas many training personnel do not conduct data-based research in their work.

Opinions were also quite positive in the Technology and Individual Instruction area. The sixth-ranking and eighth-ranking statements overall indicated agreement that CBI programs will result in greater individualization of instruction and will benefit individual students by enabling them to manage their own learning to a greater extent. The popularity of individualized instruction in our field can be seen in the general agreement ($M = 2.45$) that educational technologists should be as concerned about increasing individualization of instruction as about increasing learner achievement. Agreement on this item appears to ascribe at least equal importance to a means of instruction (individualized instruction) as to the end of producing greater student achievement. The idea that a particular method of instruction should be considered of equal or greater importance than increasing student achievement seems somewhat antithetical to the outcomes-oriented approach generally associated with the field of educational technology. Faculty were relatively neutral ($M = 2.90$) on this item, whereas doctoral and master's students had significantly stronger agreement on it.

Responses in the Educational Technology and Schools area revealed optimism about the influence of our field on education generally. The second-ranking and fourth-ranking items overall indicated agreement with statements that educational technology will play an increasing role in teacher education programs and a major role in school reform and restructuring. Overall, respondents were relatively neutral ($M = 2.92$) about whether more instruction will be delivered by computers and other media or by textbooks and teachers by the year 2010, but trainers and master's students were much more positive than faculty and doctoral students about greater use of the computer-and-media delivery mode. Trainers' responses to this item may reflect the fact that many of them work in environments in which computers, media, and state-of-the-art technology are used much more frequently than in schools and universities.

In the Instructional Design Models area, respondents agreed that improvement of existing instructional design models is an important goal of our field and that design models can be improved more by increasing learner control over instruction than by increasing program control. Trainers agreed significantly more strongly than faculty members with the learner control item. This difference of opinion may reflect differences in the respondents' work environments. Faculty typically instruct relatively large classes in which many of the students themselves are preparing to teach in classrooms. Trainers, however, often instruct in settings in which small-group and individual instruction and training of adults, frequently by computer, are the norm. Thus, personal control by individual learners may often be more feasible in the training setting than in regular classroom instruction.

The relatively low overall score in the Advances in Technology area ($M = 3.01$) indicates generally neutral opinions about the influence of technology on the roles of human beings in designing and delivering instruction. However, members of our field appear to believe that computers and technology will take over more of the functions of teachers in delivering instruction than those of instructional designers in designing it. Respondents showed moderate agreement with items indicating less teacher involvement, i.e., that advances in technology will enable schools to deliver effective instruction with less teacher involvement ($M = 2.67$), and that computer-delivered instruction will be capable of carrying out many human aspects of instruction ($M = 2.77$). In contrast, they indicated moderate disagreement with items that indicated possible reductions of their own involvement in the direct design of instruction, i.e., that instructional designers will shift from designing instruction to creating systems that design it ($M = 3.16$), and that expert systems will design effective instructional programs with minimal human input ($M = 3.40$). Respondents' confidence about the future roles of instructional designers may be another manifestation of their positive opinions about employment opportunities and job growth in our field.

Perhaps the most striking data were the differences in opinions across the four respondent groups. Statistically significant differences between groups occurred on 12 of the 30 items—40 percent of the total number. Of the four groups, faculty members had the lowest level of agreement (i.e., the highest mean score) with 22 of the 30 statements, and differed significantly from at least one other group on 11 of the 12 statements on which significant differences occurred. Master's students differed significantly from one or more groups on 10 items; doctoral students on 8 items; and trainers on 5 items. The greatest number of significant differences between any pair of groups was eight between faculty members and master's students, followed by four each between faculty and doctoral students and between faculty and trainers.

(When we found that faculty had the lowest overall level of agreement with statements of the four groups and the greatest number of significant differences of opinion, our first thought was, "Of course, faculty always have different opinions from everyone else. They probably even had greater differences of opinion among themselves than any other group." Analysis of the mean standard deviations of each group quickly dispelled this notion, however. The four standard deviations were within .04 of one another.)

Consideration of the response patterns of the four groups yields a comparative portrait for each group. Faculty are relatively skeptical. They had the lowest level of agreement with statements on the complete survey, the lowest agreement on over 70 percent of the individual statements, and the greatest number of significant differences of opinion with other groups. They had significantly lower agreement than one or more of the other groups with positive statements about the future promise of cognitive psychology in instructional design, advances in learning theory, computer-based instruction, automated instructional development, and the role of expert systems in instructional design.

Master's students contrasted the most with faculty in that they were most acceptant of positive statements about the future. Master's students had the highest level of agreement with statements on the complete survey and the highest agreement on 12 of the 30 items. Furthermore, they did not have the lowest agreement score on any of the 30 items. They had significantly different opinions from faculty members on more than one-fourth of all survey items. Master's students were more positive than faculty about the influence of learning theory on educational technology and the influence of educational technology on learning theory, and about individualization of instruction through CBI, delivery of more instruction by computers and media, and advances in technology.

Doctoral students typically held more intermediate positions than faculty members and master's students. Their overall mean of 2.48 fell directly between the means of 2.62 for faculty and 2.34 for master's students, and their mean scores on individual items were between those of faculty and master's students on more than half of the 30 items. Doctoral students' overall mean for the Educational Technology and Learning Theory area (M = 2.04) was the most positive for any respondent group on any topic area, indicating that they were especially positive about the role of learning theory in educational technology. Their opinions were relatively negative in the Advances in Technology area and toward statements in the Educational Technology and Schools area that implied a diminished role for teachers.

Trainers' responses revealed that they held several different opinions from university personnel about graduate programs in educational technology and about technology and the schools. Trainers had the lowest agreement, significantly different from faculty and doctoral students, with the statement that educational technology doctoral programs should have a strong focus on preparing good researchers. Understandably, they had the highest agreement, significantly higher than each of the other three groups, with the idea that graduate programs should focus more on preparing students for work in business and industry than in schools and universities. They also had relatively strong opinions that the educational technology field should work to develop alternatives to the teacher-based model of education and that more future instruction in the schools will be delivered by computers and other media than by teachers and textbooks. Overall, their opinions were more supportive than those of faculty and doctoral students toward an instructional approach in the schools that is more technology based and less teacher based. This position may reflect the influence of the technology-based environments in which many trainers work.

What causes the pattern of less agreement with positive statements about the future as the university level of respondents increases? The present authors offer two possible explanations. The three faculty members among us confidently assume that the greater education and experience levels of faculty give us more insight into the realities of the field and consequently temper our enthusiasm about the rate and degree of prospective advances. We reason that graduate students come to think more like us as their education, experience, and exposure to our ideas increase. The two irreverent graduate-student authors, on the other hand, have a different point of view. They argue that faculty undergo a progressive narrowing or constricting of ideas from prolonged exposure to the sheltered environment and academic minutia of the Ivory Tower. This state of mind, they believe, makes faculty members overly skeptical and less open and acceptant of new ideas and developments in the real world. Perhaps there is some truth in both the "realism" and "constrictivism" theories.

In contrast to the four groups representing different education and employment levels, respondents across the ten universities had remarkably few statistically significant differences of opinion. The smaller number of significant differences across universities may have been due in part to the smaller numbers of subjects and greater variability in numbers of subjects for universities (N's ranging from 8 to 33) than for education/employment levels (N's ranging from 53 to 85). There were greater differences in the mean item scores between universities than between education/employment groups on many items. However, only two of the university differences reached the level required for statistical significance.

Analysis of subjects' responses to the survey yields several generalizations about their perceptions of the future. The subjects in this study believe that there will be an increased need for personnel in educational technology during the next two decades, and that the major growth area for employment will be in the training field. They also believe that educational technology will play an increasing role in teacher education and a major role in reform and restructuring of the schools. Overall, they believe that learning theory will have an important influence on educational technology, although graduate students agree more strongly than faculty members with this idea. Participants in the study further agree that computer-based instruction will bring greater individualization of instruction and more student self-management of learning. However, participants are rather skeptical about the idea that computer systems will take over many of the functions of instructional designers in designing and developing instruction.

This study revealed that educational technologists are optimistic about the future of our field over the next two decades. Although opinions varied considerably across respondent groups on particular topics, the overall opinions were positive for each of the four education/employment levels and each of the ten universities that participated in the study. Hopefully, future developments will validate this positive outlook and will produce growth in our profession and in its impact on society. □

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