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ABSTRACT

A Virginia study documented the attitudes and experiences of women in technology education (TE) concerning obstacles to TE as a career choice. Reasons for entering the profession revealed a general enthusiasm for technology teaching. The support network included college professors and advisors, parents, technology teachers, spouse, and "myself." Guidance counselors were cited as exerting the most negative influence; the most frequently cited situational obstacle was little or no TE in high school. Positive influences on remaining a technology teacher were students and fellow technology teachers; the most negative marks were associated with school administrators and fellow technology teachers. Ideas for attracting females to the profession were female role models, TE in earlier grades, reducing gender bias, and better promotion of TE. Strategies suggested to retain teachers were support groups, recognition from male peers, and elimination of stereotypes. Respondents felt if the physical and curricular environments became more attractive to potential teachers and secondary school students, female enrollment would improve. Recommendations for gender equity improvement were as follows: fight sexism, change the curriculum, recruit, educate, listen, support, offer financial incentives, and make the job more pleasurable. (Appendixes include survey methodology, current job status of women in technology education, responses to survey items, and instrument.) (YLB)

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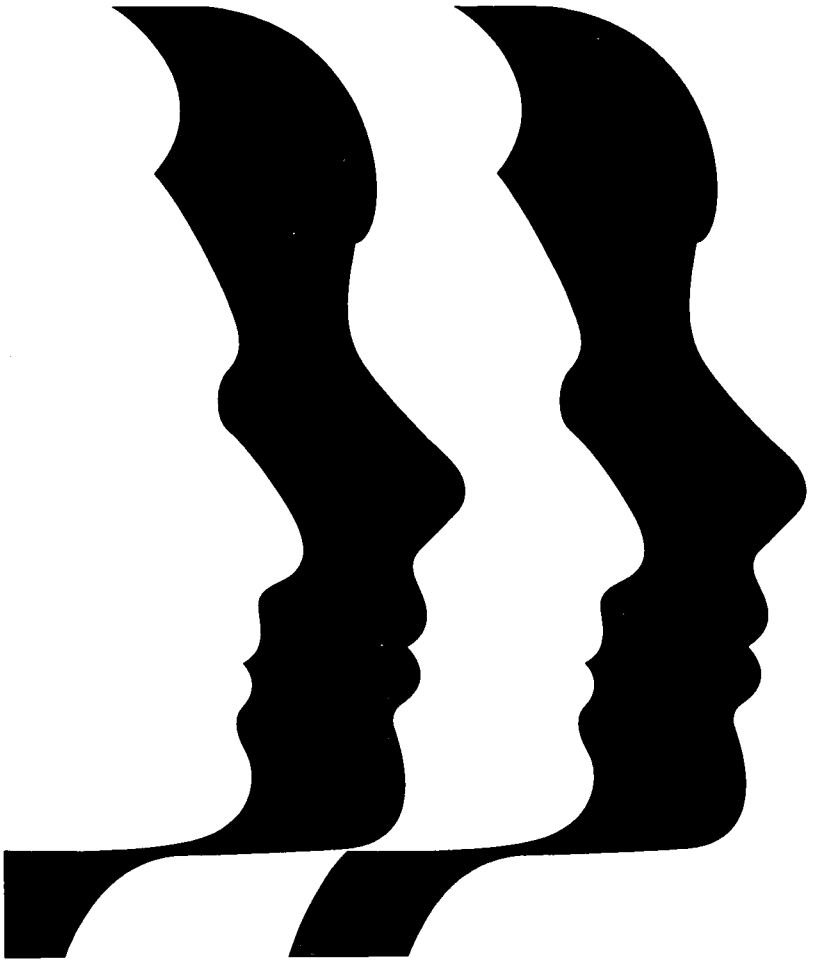
FEMALE EDUCATORS AND STUDENTS ASSESS GENDER EQUITY IN TECHNOLOGY EDUCATION



A Survey of Women Involved in Technology Education

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Female Educators and Students Assess Gender Equity in Technology Education

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Table of Contents

The Critical Path to Becoming a Technology Teacher 1
Enthusiasm for Technology Abounds 3
Support Network Important for Teachers 4
Obstacles to and Negative Influences on Becoming a Technology Teacher 5
To Stay or Not To Stay in the Technology Education Profession 9
Ideas for Attracting Females to Technology Teaching 10
Retaining Female Technology Teachers 10
Opportunities for Improving Female Enrollment in Technology Education 10
Other Issues 11
Recommendations for Gender Equity Improvement 11
Fight Sexism 11
Change the Curriculum 12
Recruit 12
Educate 12
Listen 13
Support 13
Offer Financial Incentives 13
Make the Job More Pleasurable 14
Specific Recommendations for Virginia 14
Employ Female Technology Teacher Educators in Virginia's Four College Programs ... 14
Student Advisors Should Provide a More Positive Influence 14
Provide Financial Incentives 14
Continue to Promote Gender Equity Activities 14
A Future That Includes Everyone 14
Literature Cited 15

Appendices

Appendix A	Survey Methodology
Appendix B	Current job status of women in technology education
Appendix C	Survey item #13: Which of the following do you feel is/was a significant obstacle to your remaining a technology teacher?
Appendix D	Survey item #17: What could be done to attract more females into careers as technology teachers and professors of technology teacher education?
Appendix E	Survey item #18: What should be done to make it easier for female technology teachers to stay in the technology education profession?
Appendix F	Survey item #19: What should be done to improve the enrollment and retention of females in technology education in secondary schools?
Appendix G	Survey item #20: Other issues of special concern to females in technology education

Attachment

Attachment 1	Survey Instrument

Women who choose to be professional technology teachers are in a unique position to identify barriers to increased female participation as well as strategies for overcoming those obstacles.

Now is the time for the technology education profession to improve access to the field for females across Virginia as well as nationally and internationally. Gender-biased career guidance, sexism in technology courses, unfriendly curriculum design, and lack of professional support are some of the hurdles women technology teachers and students say they face every day.

These barriers may account for why only 21 women with technology education certification are currently teaching technology courses in Virginia's public schools, based on figures from the Virginia Department of Education (VDOE). Public school enrollment of females in technology also is low—27% of the students in Virginia's technology education courses in 1992-93 were female (VDOE, 1993a). All 19 technology teacher educators listed in *The Technology Education Directory of Virginia*, are male (VDOE, 1993b). The trend in Virginia is reflected nationally and internationally. As of April 13, 1994, only 293 of the International Technology Education Association's (ITEA) 4,172 professional members were female (Ulatowski, 1994).

Through ITEA, initiatives to cultivate gender equity in technology education are underway. One of the four goals of ITEA's 1994-95 Strategic Plan is to "Enhance participation of minorities and women in technology." To achieve this goal, ITEA has laid out a number of initiatives (see Exhibit 1, p. 2).

As a male-dominated profession attempts to increase the participation of females, it is important to identify the attitudes and experiences of females already in the profession. Before curriculum can be designed to include more females, the first task "is to gain information about the diversity of the female experience," (Higginbotham, 1990). Women who choose to be professional technology teachers, or to be otherwise professionally associated with technology education, are in a unique position to identify barriers to increased female participation as well as strategies for overcoming those obstacles.

SURVEY GOALS

The goals of this study were to document the attitudes and experiences of women in technology education concerning

1. past, present, and future obstacles to technology education as a career choice for females
2. effective strategies to overcome those barriers and to encourage and facilitate technology education as a career choice for females
3. effective strategies to attract and retain females in secondary technology education
4. issues of special importance to female technology teachers.

THE CRITICAL PATH TO BECOMING A TECHNOLOGY TEACHER

Many factors contribute to a woman's decision to pursue a career in technology education,

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Exhibit 1. *Goal 4 of the ITEA Strategic Plan Advancing Technological Literacy 1994-95*

Goal 4: Enhance Participation of Minorities and Women in Technology

- ☛ Develop a female/minority leadership conference.
  - ❑ Seek funding for conference/participants.
  - ❑ Select one female/minority from each state and province to attend the leadership conference.
- ☛ Select a theme for the 1995 international conference that emphasizes females and minorities.
  - ❑ Solicit proposals for interest sessions and select activities.
  - ❑ Provide activities linked to the 1995 conference theme.
- ☛ Conduct regional and state/provincial workshops.
- ☛ Promote the involvement of females and minorities in ITEA committees and leadership positions.
  - ❑ Educate the current membership on the need for females/minorities in the field.
    - Develop a pullout section in TTT which highlights the contributions of women and minorities.
    - Develop a professional monograph devoted to diversity issues.
  - ❑ Produce public service announcement videos.
    - Identify females and minority role models to be featured.
    - Produce the content for a PSA videotape that features females and minorities in technology education.
    - Produce a videotape of the PSAs featuring females/minorities and highlighting the career options for this challenging profession.
    - Distribute PSA video at the 1996 conference.
- ☛ Create an environment of equity at all organizational levels of the ITEA.
    - Include females and minorities on committees and in leadership roles.
    - Remove gender bias, sexist language, and cultural insensitivity that may exist in all ITEA materials. (ITEA, 1994, p. 4)

including the individual's experience with technology studies while in middle and high school.

Among respondents, 41% said they had taken technology or industrial arts in grades 6 through 12, with a number of respondents taking multiple courses in the area. Among the 59% who did not take technology courses, the following explanations were typical:

- ❑ "This was not a choice for girls when I was in school."
- ❑ "Did not realize it was an option."
- ❑ "Not available."
- ❑ "No girls were allowed to."
- ❑ "Because I was pushed toward college-bound courses and never really knew."
- ❑ "My classes were always honors and college prep. They were not required, and the class schedules left no room for elective classes."
- ❑ "Stereotyped program of studies—'leather jackets' in auto, girls don't take 'those' courses, etc. I'm very sorry I didn't get involved with drafting and architecture. I seem to have a talent for it—a little late however."
- ❑ "Different interest at the time—wanted to be a social studies teacher."

While some women chose in high school to become technology teachers, many respondents made the decision in undergraduate school, usually in the

sophomore year. Others made the decision significantly later, sometimes well after earning a baccalaureate degree.

The following responses were typical:

- "I didn't decide, it sort of evolved. I was interested in computers at their outset and just continued."
- "9th-10th grade. 1973-74."
- "My senior year in high school—after a long talk with my H.S. drafting teacher."
- "First year of college."
- "Sophomore in college (B.S.)."
- "Post baccalaureate pre-masters."
- "When I applied for doctoral program."
- "After teaching 10 years—technology education seemed more relevant to students' needs."
- "After teaching 25 years in industry. After my daughter finished college. As I raised her as a single parent and had no opportunity for post-secondary education when younger."
- "Early 20s."
- "Age 44."

Enthusiasm for Technology Abounds

Reasons for entering the profession were diverse—some were intentional and others were unintentional. Often, teaching technology seemed to be personally enjoyable due to a particular attraction to the technical work involved and a commitment to helping youngsters learn about technology. A general enthusiasm for technology teaching was evident in many responses:

- "Interest and aptitude in industrial arts while in H.S."
- "Always wanted to be a teacher for as long as I can remember. I became interested in Technology Education after

A Profile of Women Involved in Technology Education

The 49% response rate to the survey (184 of the 375 individuals solicited) was higher than expected by the survey designer and suggests the enthusiasm and commitment of respondents. Because respondents chose to send back the survey instrument, the survey sample was self-selected (see Appendix A for survey methodology).

The survey sample of women in technology education consisted of four groups:

1. Women certified in technology education (endorsement code 7200) in Virginia currently teaching technology education in Virginia's public schools (Group V)
2. Women currently enrolled as technology education majors in undergraduate or graduate programs at Virginia colleges and universities (Group M)
3. Professional members of ITEA who indicated "female" on their membership applications (Group P)
4. Student members of ITEA who indicated "female" on their membership applications (Group S).

The number of respondents in each of the four survey groups is shown in Exhibit 2 below. Many "Student Members" were full-time technology teachers, while some "Professional Members" were full-time students. Thus, distinctions between "Students" and "Professionals" are not completely accurate.

Exhibit 2. *Questionnaires received from each survey group*
(Note: Three surveys were received that could not be assigned to a group.)

Females	Within Virginia	ITEA Members Outside Virginia
"Professionals"	Group V: 15 (71% of 21)	Group P: 120 (47% of 253)
"Students"	Group M: 8 (42% of 19)	Group S: 38 (46% of 82)

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listening to a professor talk about it as a career option in college."

- "In the late '70s I was working as a cabinetmaker. The attitudes of the men in the field were not especially positive toward women. These difficulties were not decreasing for any of the other women in the trades that I knew. I decided that the only way we would become accepted was to have women role models in school, so I returned to school to certify in industrial arts."
- "I like to work with my hands, so IA was a natural choice. The field has changed, and, fortunately, I like the changes."
- "I really wanted to become a commercial artist but went to college to become a Graphic Arts teacher, hoping to fall back on teaching after my career in advertising and graphic arts was over."
- "I enjoy creative problem solving and working with people. I also wanted to learn the skills involved in technology for my own sufficiency."
- "Initially, because my father was an IA teacher. Then once I was involved in it, I realized it was something I was good at."

College Degrees Completed

Of the 184 survey respondents, 17 had completed a doctorate, 92 a master's, 138 a bachelor's, and 27 an associate's degree. However, the latter three degree categories are low estimates, as a few respondents only checked off their highest degree.

Nineteen respondents were working on a doctorate, 28 on a master's, 26 on a bachelor's, and 3 on an associate's degree. Nearly 20% of the respondents had either completed or were working on a doctoral degree.

Among Virginia respondents, 4% had completed the doctorate, compared to 10% of respondents outside Virginia. Similarly, 4% from Virginia were working on a doctorate, compared to 11% of respondents outside Virginia.

Support Network Important for Teachers

When asked who gave them the most support in their decision to become technology teachers, respondents wrote in a wide variety of answers, including three individuals who wrote, "Everyone," and three who wrote, "No one." Responses were categorized. The five most frequent responses were college professors and advisors (56 respondents); parents (33); technology teachers (17); spouse (15); and "myself" (9).

The high ranking of college professors as supporters of a woman's decision to become a technology teacher is also evident in the responses to another survey question, which asked, "Overall, how much of a negative or positive influence is/was each of the following in your path to becoming a technology teacher?" Respondents could choose among 24 categories of people, that included "Mother," "Father," "Male high school students," and "Co-workers." Respondents were also provided space to specify "Other."

Responses to categories of influencers are listed in Exhibit 3 (see p. 5), sorted according to mean score. Exhibit 3 also contains the sum of points, total positive points, total negative points, and the percentage of negative points for each category. This breakdown is useful in identifying the type and quantity of influence attributed to each category and assessing the degree to which each category has been a source of split influence.

"Other" sources of support reported by respondents included students, curriculum, technology education associations, support agencies, and "myself." In a previous survey of high school technology education students, "a surprising number of girls (28%) chose to write in 'myself' as the sole response" when asked who most encouraged them to take technology education (Silverman and Pritchard, 1993). Self-reliance and pride in their own

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Exhibit 3. *Influence of individuals on women becoming technology teachers, based on a 5-point scale from -2 (negative influence) to +2 (positive influence)*

Individual	Mean Points	Sum of Points	Positive Points	Negative Points	Percent Negative
College professors in technology education	1.39	217	228	-11	4.6%
Friends	1.12	171	166	-6	3.5
Mother	0.96	149	154	-5	3.1
Father	0.88	135	151	-16	9.6
College advisors	0.86	129	136	-7	4.9
Spouse or significant other	0.83	111	117	-6	4.9
Graduate students	0.64	95	101	-6	5.6
Undergraduate students	0.61	89	97	-8	7.6
High school technology teachers	0.58	85	101	-16	13.7
Other college professors	0.57	85	98	-13	11.7
Co-workers	0.57	82	87	-5	5.4
Brother(s)	0.55	78	81	-3	3.6
Other family members	0.52	74	80	-6	7.0
Sister(s)	0.54	74	76	-2	2.6
Supervisor at work	0.51	73	83	-10	10.8
Role model	0.53	63	68	-5	6.8
Your children	0.44	52	52	0	0.0
Other	0.67	49	51	-2	3.8
Support group	0.39	48	48	0	0.0
Other middle & high school teachers	0.22	31	53	-22	29.3
Middle school technology teachers	0.20	29	42	-13	23.6
Elementary school teachers	0.11	16	30	-14	31.8
Female high school students	0.02	3	24	-21	46.7
Male high school students	-0.03	-4	20	-24	54.5
Guidance counselors	-0.30	-42	20	-62	75.6

abilities and accomplishments seemed typical of women in the present study.

Generally, responses from the Virginia groups were representative of the entire survey sample. However, the greatest difference of any two groups on these 24 sources of influence was between Virginia technology education majors and student members of ITEA regarding college advisors. Students within Virginia gave their college advisors a mean score of +0.63, whereas those outside Virginia scored advisors at +1.34. This difference was not evident in the scores for technology education professors (+1.50 and +1.40, respectively).

Obstacles to and Negative Influences on Becoming a Technology Teacher

Categories of people who presented a negative influence on women becoming a technology teacher are presented in Exhibit 3. "Guidance counselors" were cited as exerting the most negative influence in a woman's path to become a technology teacher, as shown in both the number of negative marks and in the percentage of marks that were negative. In contrast, a study by Silverman and Pritchard (1993) asked boys and girls "who most encouraged them to take technology education" in high school. Of the six choices, "My guidance

The "need to work and earn money" was indicated as an obstacle to becoming a technology teacher by 63% of Virginia technology education majors.

counselor" received the highest scores from both girls and boys (although "Other" was higher still).

The discrepancy between the present study and that of Silverman and Pritchard is attributable to the following factors:

1. Their survey sample was counseled by a much smaller number of guidance counselors than was the present survey sample.
2. Their survey sample of high school students, whereas the current survey sample is older, many of whom were in high school in the 1950s through 1970s.

In the latest survey, the following categories of people received the most negative marks, exerting a considerable negative influence on women becoming technology teachers: "guidance counselors," "male high school students," "other (not technology education) middle school and high school teachers," and "female high school students." The pressure to conform to sex-role stereotypes seems to be great during middle and high school.

In an attempt to determine situations that presented barriers to the pursuit of a technology teaching career, respondents also were asked, "Which of the following factors do you feel is/was a significant obstacle to your becoming a technology teacher?" Respondents could choose from among 12 factors, with additional space for specifying "Other" factors not printed on the questionnaire.

The most frequently cited obstacle to becoming a technology teacher was, "Little or no technology education in high school" (81 respondents). As shown in Exhibit 4 (see p. 7), other primary deterrents include "Attitudes of male technology teachers" (75); "Lack of awareness about the field" (56); "Attitudes of male classmates in high school or college" (39); "Insufficient funding while in college" (35).

The survey groups varied in the percentage of their members citing these obstacles to becoming a technology teacher. As shown in Exhibit 5 (see p. 8), technology education majors in Virginia cited 7 of the 12 listed obstacles more frequently than the other groups. "The need to work and earn money" was indicated as an obstacle by 63% of Virginia technology education majors, but only by 24% of student ITEA members, 14% of ITEA professional members, and 7% of certified technology teachers in Virginia.

The obstacles listed in Exhibits 4 and 5 were printed on the questionnaires; however, on a previous survey question (Item 11), participants were asked to write in an answer to the question, "Who or what was the biggest obstacle you faced in becoming a technology teacher?" Responses were categorized. The

Current Job Status of Survey Participants

Some survey respondents were not technology teachers, professors, or students. A few of these individuals held administrative or supervisory positions in education. A few teachers of subjects other than technology and a few elementary teachers responded to the survey. Reported job titles not pertaining to school positions included mother, sales representative, editor, consultant, research associate, training specialist, and none.

Technology teachers use a variety of terms to describe their jobs and have had or have a variety of other careers in addition to teaching. See Appendix B for more descriptions of job titles and teaching assignments.

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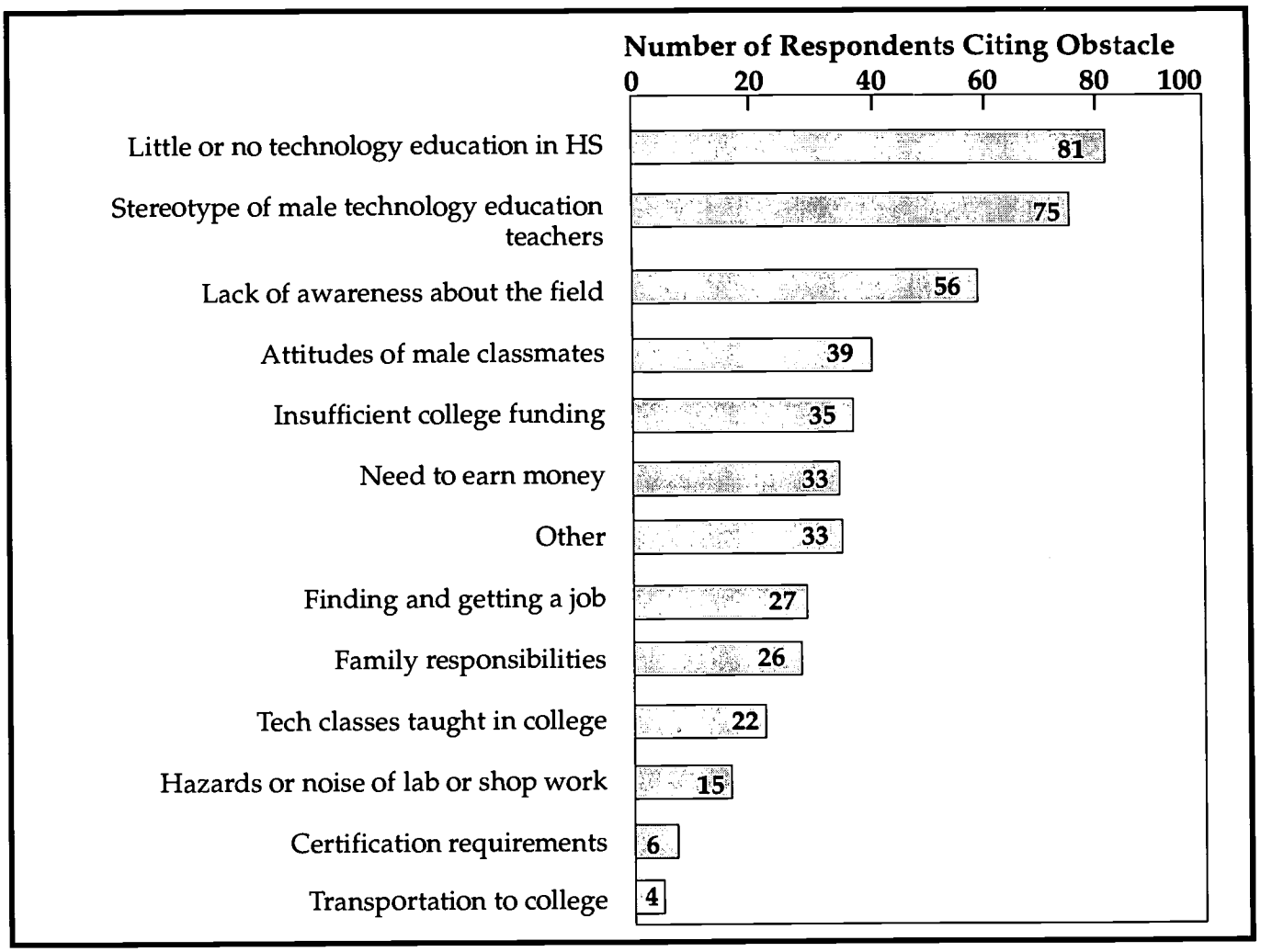
Exhibit 4. *Significant obstacles faced by women surveyed about becoming a technology teacher*



most frequently cited responses were money (17 respondents); stereotypes/sexism/bias/prejudice (15); lack of knowledge or experience (12); time (11); professors (11); "myself" of lack of self confidence (10); and isolation of being the only female (7).

Quite a few respondents to Item 13 specified "Other" obstacles, which included

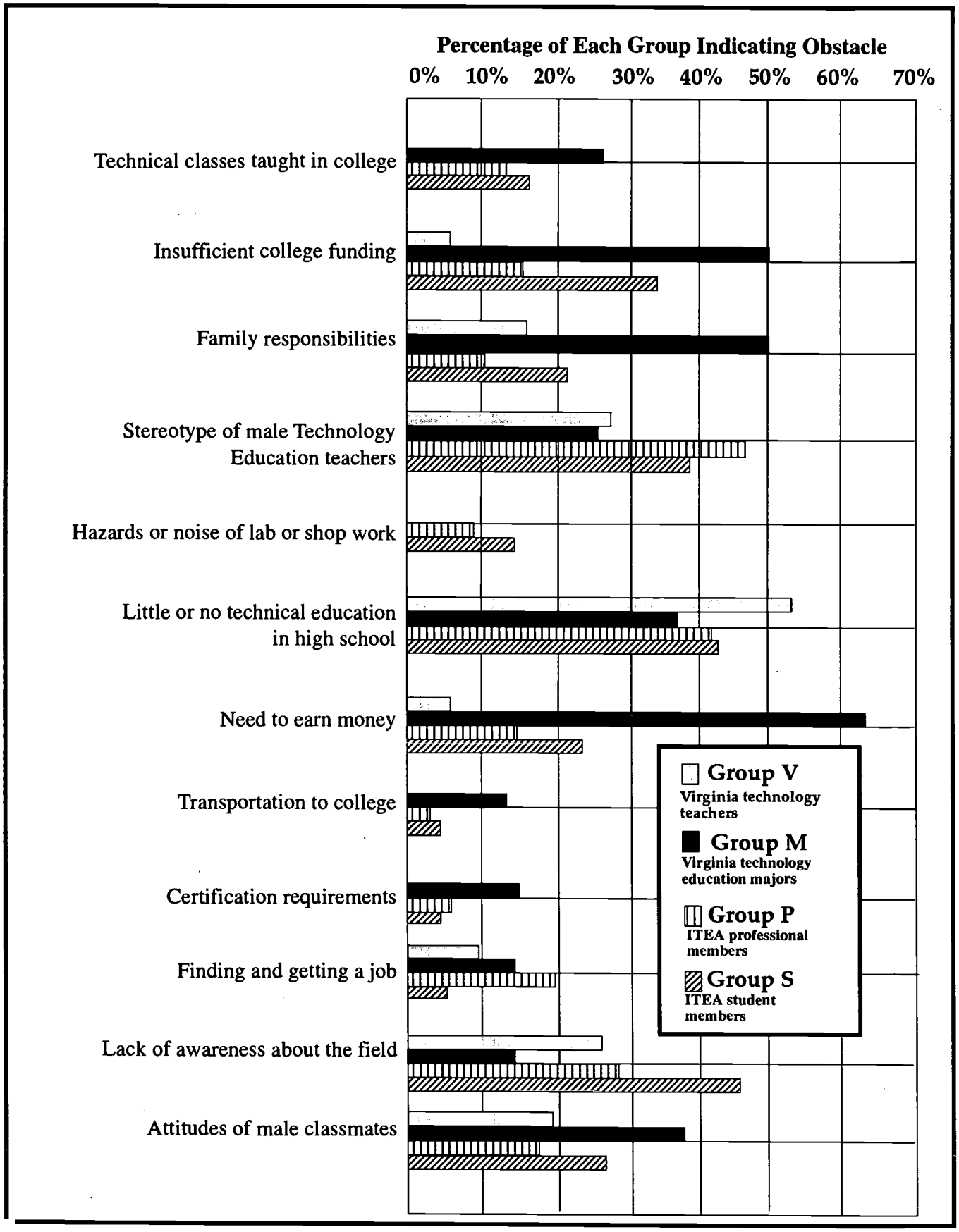
- "NTE."
- "Lack of exposure to technology while in college (undergrad)."
- "Programs closing in schools because of small schools consolidating or grad requirements. This was the problem [when] I wanted to teach in a different state or region."
- "The stereotype of this being an easy field for rejects."
- "Funding of technology."
- "Lack of awareness & what & how to incorporate it into education."
- "Colleges pay lip service to wanting female faculty but will not willingly employ them."
- "Lack of self-esteem!"
- "Always needing to research background info. Professors assumed we all knew—like simple machines, etc."
- "Attitudes of doctoral professors, 'Good ol' Boys Club.'"

A few respondents noted that interviews presented a problem:

- "Acceptance by hiring personnel at school level."
- "Males who gave interviews for jobs."
- "Attitudes of prospective employers."

When asked if it is easier or more difficult for a female in comparison to a male to get a

Exhibit 5. *Percentages of each survey group indicating obstacles in response to: "Which of the following factors do you feel is/was a* ***significant obstacle*** *to your* ***becoming*** *a technology teacher?"*



job as a technology education or industrial arts teacher in secondary schools, 43% percent (66) of respondents checked "More difficult," 34% (52) checked "No difference," and 23% (35) checked "Easier."

A comparison was made between students and professionals responding to this question. While 34% of students and 34% of professionals indicated "No difference," 48% of professionals and 26% of students indicated "More difficult." A possible explanation for this difference is the greater experience of professionals, especially experience in previous decades. However, the variance may be due to age discrimination working against the (generally older) professionals, or to other factors. As noted above, a few respondents felt that interviewers were an obstacle in getting a job.

To Stay or Not To Stay in the Technology Education Profession

Once females overcome the barriers to pursuing a career in technology education, they often encounter equally challenging conditions on the job, as reflected by survey participants' responses to the following questions.

Overall, how much of a negative or positive influence is/was each of the following in your remaining a technology teacher?

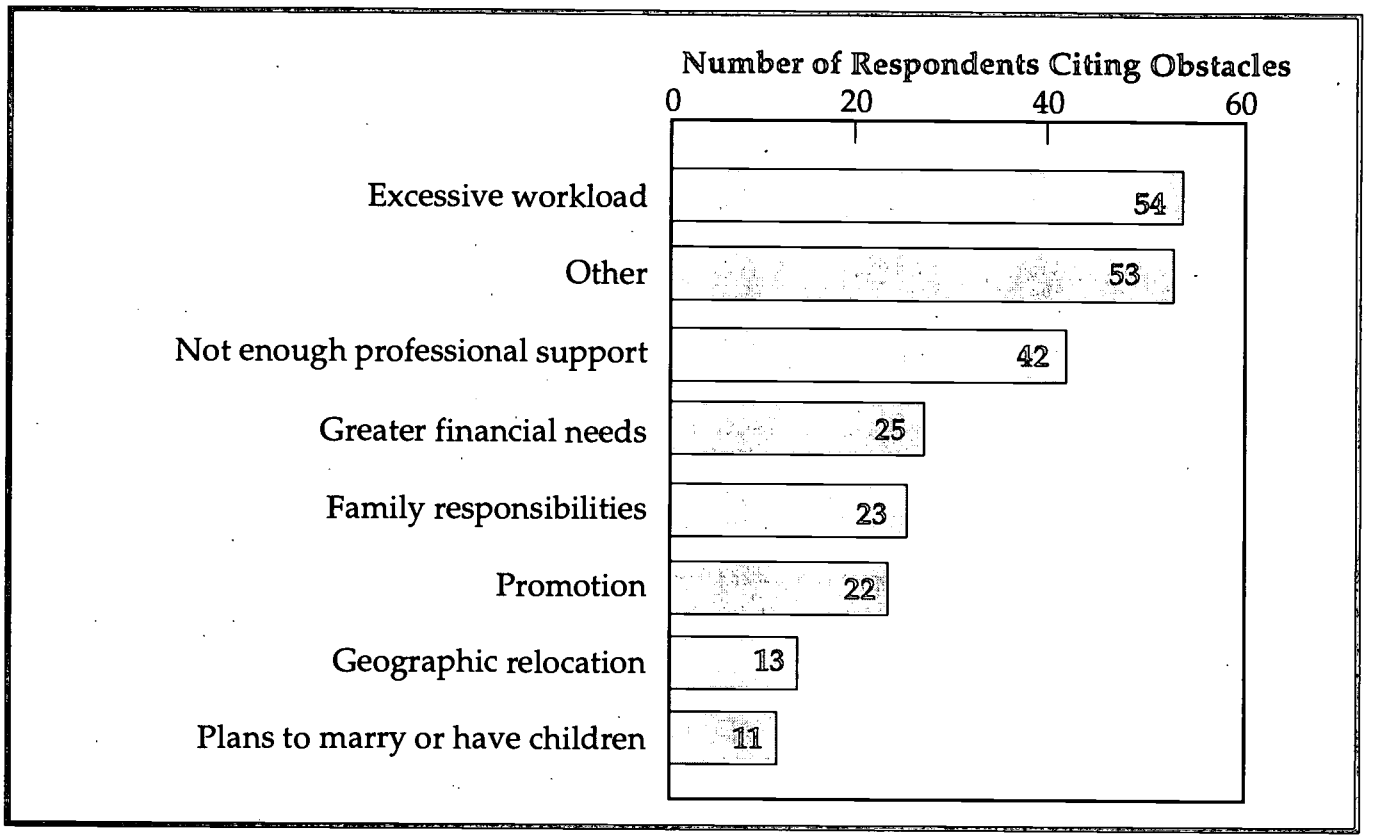
"Your students" and "Fellow technology teachers" received the greatest number of positive marks (see Exhibit 6). In each of the categories listed, fewer than 17% of the marks were negative. The most negative marks were associated with "School administrator" and "Fellow technology teachers," the latter being especially disturbing. As seen by the percentage of negative marks for each category in Exhibit 6, "School administrator," "Fellow technology teachers," and "Other" are associated with the greatest percentages of negative marks, indicating that each has been a positive or negative influence. No respondents indicated any negative influence from "Sister(s)" or "Other family."

Respondents specified a number of "Other" sources of positive and negative influence, including college professors and administrators, supervisors, technology associations, and parents of students. Sources of negative influence specified under "Other" included academic teachers, custodial staff, clerical staff, sales representatives, and males in the program.

Exhibit 6. *Influence of individuals on women who remain technology teachers, based on a 5-point scale from -2 (negative influence) to +2 (positive influence)*

Individual	Mean Points	Sum of Points	Positive Points	Negative Points	Percent Negative
Your students	1.44	183	190	-7	3.6%
Fellow technology teachers	1.18	152	172	-20	10.4
Friends	1.09	134	135	-2	1.4
Fellow teachers (not technology)	1.04	127	139	-12	7.9
Mother	1.00	125	132	-7	5.0
Spouse or significant other	1.11	125	136	-11	7.3
Father	0.89	109	117	-8	6.5
School administrator	0.88	108	134	-26	16.5
Other family	0.72	82	82	0	0.0
Brother(s)	0.72	81	82	-1	1.2
Sister(s)	0.68	76	76	0	0.0
Your children	0.65	68	72	-4	5.1
Other	1.03	41	51	-10	15.9

Exhibit 7. *Significant obstacles faced by women surveyed about remaining a technology teacher*



Which of the following do you feel is/was a significant obstacle to your remaining a technology teacher?

"Excessive workload" was most frequently cited as a significant obstacle (see Exhibit 7). Excessive class size, lack of administrative support, insufficient school finances, lack of cooperation by peers, and student behavior also were commonly cited obstacles to remaining in the profession. A large number of "Other" obstacles were specified by respondents, (see Appendix C).

Ideas for Attracting Females to Technology Teaching

The question of "What could be done to attract more females into careers as technology teachers and professors of technology teacher education?" drew many responses. These included female role models, technology education in earlier grades, reducing gender bias, redesigning curriculum, better promotion of technology education, and many more (see Appendix D).

Retaining Female Technology Teachers

Survey respondents were asked, "What should be done to make it easier for female technology teachers to stay in the technology education profession?" While some felt there should be no special actions taken specifically to retain female technology teachers, others suggested a variety of strategies including

- support groups
- recognition from male peer
- elimination of stereotypes
- professional growth opportunities
- increased support for vocational education from local school districts
- reversal of the trend that makes vocational education classes a "dumping ground" for problem students.

(See Appendix E for additional survey responses.)

Opportunities for Improving Female Enrollment in Technology Education

When asked, "What should be done to improve the enrollment and retention of females in

technology education in secondary schools?" many survey participants referred to their responses to previous survey items. In short, if the physical and curricular environments become more attractive to females in general, then they will become more attractive to potential teachers and to secondary school students.

Ideas for improvements included providing young girls with female role models in technology-related professions, developing mandatory introductory classes to technology, developing gender-neutral work projects, and community education to illustrate the benefits of technology education for young women and men. (See Appendix F for additional survey responses.)

Other Issues

The final item on the questionnaire asked the respondent to "Please discuss, as you see fit, any of the issues mentioned above, or any other issues that might be of special concern to females in technology education." A sample of their comments follows (see Appendix G for additional survey responses):

> "I believe it is made more of than it actually is. As a woman who went through IA/TE, I ran into only one obstacle. If a person cannot overcome some small hurdles then they might have obtained things too easily. There have been instances when I have been offered positions on the basis of my gender. This is the greatest insult of all."

> "Perhaps a follow-up should be done of women to find out what attracted us to Technology Education, what factors cause us to stay versus the factors that cause us to leave because there's always a weighing and balancing effect and for me the benefits or factors that cause me to stay have not been greater than the obstacles. And after 18 years it's difficult to switch careers or be reeducated (finally impossible—you get used to the paycheck) or I probably would leave the profession."

The technology education community also has the opportunity to change the attitudes of its current and future members, reducing the "chilly climate" that women and other minorities experience.

> "I think you've addressed some very important issues. However, (just from my own experiences) are males ready for females in technology? When I was the only female student in a Power class my professor (tenured, 50-ish) handed me a torque wrench and said, 'Here, wench. You try it.' I knew I had a long road ahead! I wish we were all equal—never having issues of gender, race, religion, etc. to deal with at all!"

Recommendations for Gender Equity Improvement

Women involved in technology education are in a unique position to offer insight and suggest strategies regarding gender equity in the field. Their views and experiences are diverse. Overall, they are positive about teaching technology and interested in gender equity in technology education. The challenges they face warrant attention and action from the technology education profession.

Fight Sexism

To make technology education an enjoyable field for females and males, there must be zero tolerance of sexism in the classroom. Unfortunately, some technology education teachers and professors are making it more difficult for female students enrolled in technology education by permitting and even promoting sexism in their courses. Efforts should be made to eliminate bias and sexist attitudes held by male technology education professionals and by males studying to become technology teachers. The technology education community also has the opportunity to change the attitudes of its current and future members, reducing the "chilly climate" that women and other minorities experience.

If technology education is truly an imperative for our youth, we must restructure high school course scheduling to allow (and counsel) college-bound students to study technology, even if for only one hour per week.

Many educators may not be aware that ITEA publishes *Guidelines for Equity Issues in Technology Education* (Boben, 1985). The *Technology Teacher* has been an appropriate conduit for increasing the sensitivity of technology teachers, technology professors, and technology students to gender equity (Flowers, 1994).

Change the Curriculum

Many of the reasons females in this survey sample gave for choosing technology teaching as a career were related to personal enjoyment. To increase the number and improve retention of female technology teachers, the technology education community should consider making technological studies (K-12 and in college) more enjoyable for female students.

Curricular revision might be effective in making technology education more female-friendly if technology education is redefined without a male bias. A move toward a not necessarily industrial but truly technological basis for instruction may attract a broader range of individuals into the field. Existing programs need updating and housing in modern facilities. A method or instrument should be developed to assess sex bias in technology curriculum and activities. Technology education activities should be supplemented to ensure that a wide variety of activities is presented to students, including male-typical, female-typical, and gender-neutral activities.

Single-sex technology classes should be studied as a possible vehicle to empower female technology students. Many respondents noted that college-bound students, male or female, often have little time in their schedule for technology education and are advised to take a different set of courses. Merely opening the doors of technology education to females is not enough. If technology education is truly an imperative for America's youth, school districts must restructure high school course scheduling to allow (and counsel) college-bound students to study technology, even if for only one hour per week.

Only 41% of the survey sample enrolled in technology education or industrial arts in grades 6 through 12. College curriculum in technology education must not be designed or presented in a way that assumes students have previous high school experience in technology education.

Recruit

A considerable number of women without high school technology education courses and with little prior awareness of the field have elected to become technology teachers. Therefore, efforts to recruit technology teachers should be directed at a much broader population than just those who are or have been involved in technology education. The choice to teach technology can occur before, during, or after college, so recruitment efforts should attempt to attract future female technology teachers at many levels, including high school, undergraduate school, graduate school, and in environments not related to educational institutions.

Because a number of survey respondents chose technology education careers after receiving a baccalaureate degree, lateral entry into the profession of technology teaching from other teaching disciplines should not be overlooked during recruitment and training of future technology teachers. Exposure of technology education to other teachers in middle schools and high schools, including team teaching experiences, may attract some of these professionals into technology teaching.

Educate

Everyone must be educated about technology education. Initiatives to increase the exposure of all elementary and middle school students to technology education may combat the lack

of awareness about the field and the stereotypical image that the field is appropriate only for males. Educational initiatives on the "new technology education" and its appropriateness for females should be targeted to the following groups: technology teachers, other teachers, school administrators, guidance counselors, parents, students (K-12), technology professors, university students, and the general public.

Educational and promotional efforts should occur in a variety of settings. Female role models may be the most effective educational/promotional tool available in the struggle for gender equity in technology education.

Listen

In addition to education and public relations, other needed aspects of communication involve listening and sharing. It is critical that dialog on equity issues (gender, race, age, etc.) continue in the technology education profession. Since every state in the U.S. has a Gender Equity Coordinator, gender equity research may tend to be fragmented. Centralization of research results on equity issues is needed. ITEA is in a good position to establish this centralization and to sponsor meetings and research on equity issues.

Support

As women participating in this study pursued technology teaching careers, their primary support came from technology education professors. As colleges and their departments struggle and compete to recruit and retain students, there is a tendency for a professor to be supportive of nearly any potential student in order to maintain healthy enrollments (and future employment).

Although self-reliance and pride in their own abilities and accomplishments seemed typical of women in the present study, recruitment and retention efforts should not overlook the need for support. The University of Nebraska at Kearney developed a plan to recruit and support female technology teacher education majors (Miller, 1991). This plan entailed forming "a support system designed to retain women students who had indicated an interest in TTE as a major field of study," which included a special recruitment/retention course for female students. Active chapters of the Technology Education Collegiate Association and on-campus "Women's Centers" can provide additional support for female technology education majors who wish to take advantage of their services. Mentoring can offer support to women while in college and during the first few years of teaching. A wide variety of support systems are possible and necessary, yet no single system is appropriate for all women due to the different needs of individuals.

Female technology teachers need professional support from local and international networks. It is essential that female technology teachers receive support from other technology teachers. With so few female technology teachers, specific networks of women in technology education should be established to overcome the isolation. Although some of these networks are informal and personal, ITEA, state technology associations, and colleges with technology teacher education programs may be able to facilitate the establishment and continuance of more formalized networks of support.

Although self-reliance and pride in their own abilities and accomplishments seemed typical of women in the present study, recruitment and retention efforts should not overlook the need for support.

Offer Financial Incentives

Possible financial needs of prospective female technology education majors should not be overlooked. Respondents identified money, more than anything else, as the greatest obstacle to becoming a technology teacher. While respondents to this survey have remained affiliated with technology education, how many potential female technology teachers have been unable to pursue technology teaching because of insufficient funds? College

The Commonwealth of Virginia should make a special effort to attract and retain female technology teacher educators.

recruitment efforts must include providing financial incentives for women and other minorities in their pursuit of technology education certification.

Make the Job More Pleasurable
Technology teachers should not be as overburdened with work as they currently report to be. Administrators should ensure reasonable class sizes and program funding. Guidance departments must view technology education as an intellectually challenging discipline, appropriate for males and females, whether or not they are college-bound. Technology education must not be used as a "dumping ground" for students.

Specific Recommendations for Virginia

Employ Female Technology Teacher Educators in Virginia's Four College Programs
The Commonwealth of Virginia should make a special effort to attract and retain female technology teacher educators. At Virginia's four universities offering technology education, none of the 19 technology teacher educators is female. At least one woman should be on the faculty at each of the state's four technology teacher education programs.

Student Advisors Should Provide a More Positive Influence
Student advisors at Virginia's colleges are not as positive an influence as they seem to be elsewhere regarding a woman's pursuit of a technology teaching career. Special efforts should be made to help these advisors become more of a positive influence. The Virginia Council on Technology Teacher Education is in a good position to sponsor such an initiative, provided that it enlists the aid of females in the technology education profession.

Provide Financial Incentives
A greater need exists for financial incentives for female technology education majors at Virginia's universities than there is elsewhere. Funding must be found to offset tuition and other expenses of women as they study to become technology teachers in Virginia.

Continue to Promote Gender Equity Activities
In addition to this study, the Technology Education Service of VDOE should continue its support of initiatives addressing equity issues in technology education.

A Future That Includes Everyone
Future efforts should continue to explore technology education in relation to the tremendous variety of individuals. Generalizations can be inaccurate or misleading. One person's obstacles may not exist for another person; strategies to overcome barriers may be appropriate for some individuals and inappropriate for others (e.g., not everyone wants a support group).

Equity issues are often related. In some cases, similar strategies may be used to fight both sexism and racism. Promoting gender equity in one environment may have positive impacts on another. For example, by making technology teacher education programs at universities more "female-friendly," enrollment of women may increase, resulting in more female role models in middle school and high school technology education classes.

The results of this survey reinforce and supplement ITEA's strategic plan. Now is the time for taking specific actions, in Virginia and elsewhere, to improve gender equity in technology education. Such initiatives should not overlook the talented and highly motivated pool of women currently involved in technology education.

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APPENDIX A

Survey Methodology

The survey sample of women in technology education consisted of four groups:

1. Women possessing technology education certification (endorsement code 7200) in Virginia currently teaching technology education in Virginia's public schools (Group V).
2. Women currently enrolled as technology education majors in undergraduate or graduate technology education programs at Virginia colleges and universities (Group M).
3. Professional members of ITEA who indicated "female" on their membership applications (Group P).
4. Student members of ITEA who had indicated "female" on their membership applications (Group S).

With the aid of VDOE's Principal Specialist for Technology Education, the listing of the Commonwealth's female technology teachers was cross-referenced with the listing of individual teaching endorsement codes. The result was a list of females certified in technology education and employed as technology teachers in Virginia's public schools. All 21 names on this list, including 10 that were on ITEA membership lists, became Group V.

Technology education faculty and staff were contacted at the Commonwealth's four universities that offer technology education degrees: Norfolk State University, Old Dominion University, Virginia Polytechnic Institute and State University, and Virginia State University. These contacts agreed to send the survey to females enrolled in undergraduate or graduate technology degree programs at their institutions. These 19 university students in Virginia, 5 of whom were student members of ITEA, were assigned to Group M.

Mailing labels were requested from ITEA for Groups P and S. The mailing list reflected membership as of April 13, 1994. On that date, ITEA had 4,172 professional members, 3,294 (79%) of whom had indicated "male" on their membership applications, and 263 (6%) of whom had indicated "female." Therefore, of those who indicated either "male" or "female," 7% were women. Professional members of ITEA were classified as Group P, unless they were Virginia residents (in which case they were classified as Group V). A number of female professional members of ITEA are not technology teachers, yet they were included in Group P. Conversely, technology teachers who were not members of ITEA and those who did not indicate "female" on their application were not included in Group P.

As of April 13, 1994, ITEA had 540 student members, of whom 383 (71%) had indicated "male," and 87 (16%) had indicated "female" on their membership applications. Therefore, 19% of ITEA's student members who indicated their sex on their applications were "female." Student members of ITEA were classified as Group S, unless they were current majors in technology education programs at one of Virginia's universities, in which case they were classified as Group M.

A code was assigned to each of the 375 subjects in the sample and included on the questionnaires.

Pilot Testing

An initial survey instrument was developed with the continuous assistance of a female technology teacher from Norfolk. The preliminary questionnaire was then pilot tested with the help of four other women: one professional member of ITEA from Virginia, one professional member of ITEA from another country, one student member of ITEA from outside Virginia, and one researcher in another state who recently studied females in technology education. The instrument was revised based on pilot testing.

Mailing

The revised questionnaire was mailed, with a cover letter and self-addressed stamped envelope, to each individual in Groups P, S, and V on May 1, 1994. Surveys for Group M also were sent on that date to contacts at each of Virginia's universities with female technology education majors. A second mailing was sent on May 15, 1994, to non-respondents in Groups P, S, and V. Responses were accepted until June 15, 1994.

APPENDIX B

Current job status of women in technology education

Technology teachers use a variety of terms to describe their jobs. Following is a sample of "present job titles" listed by respondents who teach technological areas (capitalization intact):

- Teacher
- Technology Teacher
- Technology Education Teacher
- Industrial Education & Technology Teacher
- Industrial Arts/Technology Education Teacher
- Ag & Technology Teacher
- Teacher - ITE (Industrial Technology Education)
- Technology teacher
- Teacher - Industrial Technology
- Diversified Technology teacher
- Technology Instructor
- Instructor
- Classroom teacher: Technology Education
- Drafting Instructor
- Teacher/Industrial Arts
- Industrial Technology Instruction
- Industrial Technology Teacher
- Instructor of Technology
- Teacher - Technology - Science

Although some of these terms are certainly not formal job titles, the variety of job descriptions reported is one sign that the field of technology education is disjointed. The use of the word "industrial," in particular, alludes to comments elsewhere on the questionnaires that address the focus of technology education.

When asked to list their other careers, technology instructors provided 125 responses, including teaching, construction, sales, art, woodworking, writing, editing, business management, and consultation.

Those who teach were asked to indicate their present teaching situation from a list of five choices. Of that group, most teach in a middle school or junior high school (see Exhibit A). Without data from males, it is not possible to determine whether female technology teachers gravitate toward the middle school more than their male counterparts.

A distinction was found between professionals within and outside Virginia. While 12% of women professionals outside Virginia presently teach technology education at a college, none of their Virginia counterparts teach at the college level. Female technology education professors in the Commonwealth of

Exhibit A. *Present teaching assignments of respondents*

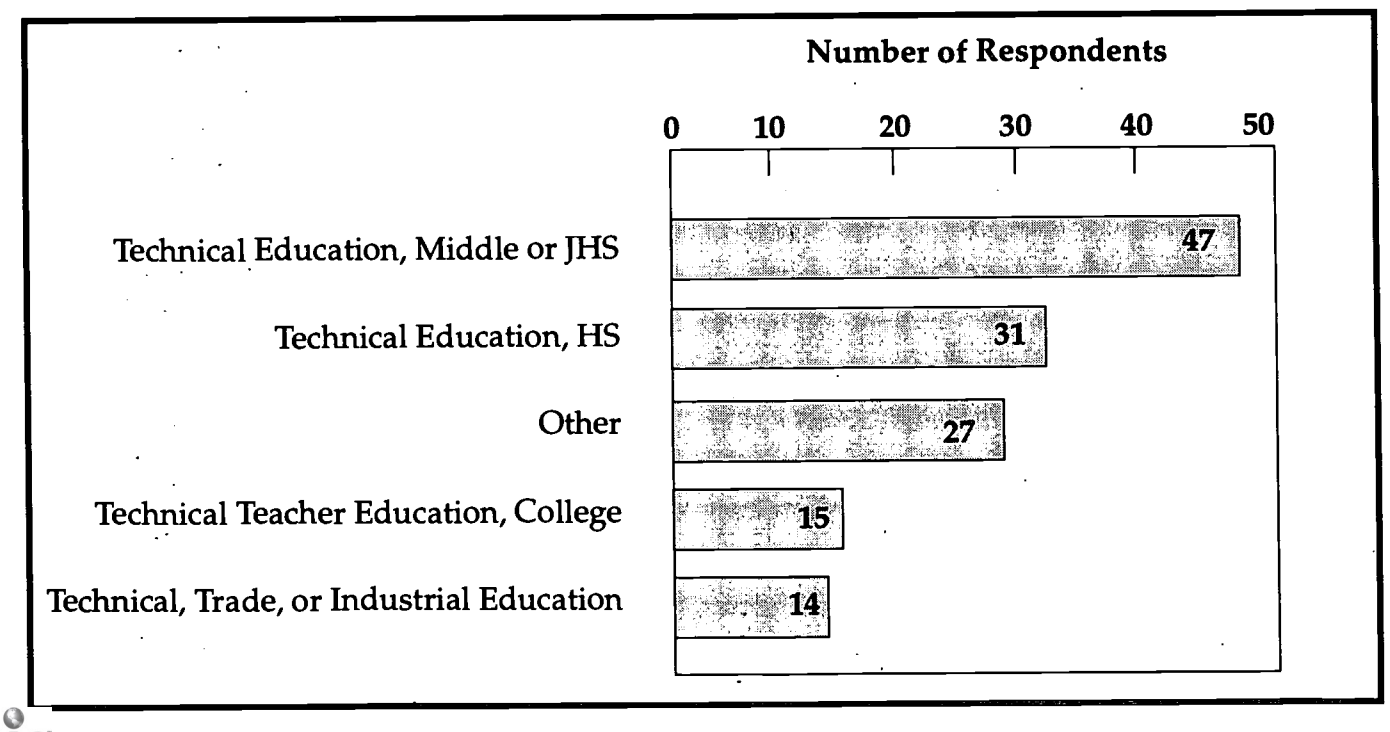

Exhibit B. *1992-93 secondary school enrollment in state-approved technology education programs in Virginia (VDOE, 1993a)*

Program	Total	Male	Female	% Female
Total Middle School	84,469	55,399	29,070	34.4
Total High School	39,060	34,863	4,197	10.7
HS: Production	14,665	13,915	750	5.1
HS: Design & Illustration	12,382	11,046	1,336	10.8
HS: Communication	4,424	2,974	1,450	32.8
HS: Control	4,325	4,174	151	3.5
HS: Principles of Technology	1,439	1,126	313	21.8
HS: Pre-Engineering	1,337	1,207	130	9.7
HS: Design & Technology	488	421	67	13.7

Virginia are currently lacking—there are 19 male but no female technology teacher educators in Virginia's universities (VDOE, 1993b).

Survey respondents were asked to indicate the number of years they had taught in each of five technological areas. Female technology teachers have spent many years teaching a general overview of technology, communication-related technologies, and production-related technologies.

The technology education teaching assignments of respondents can be related to secondary enrollments. Although secondary enrollments in technology education nationwide or internationally are not available, enrollment figures for Virginia are presented in Exhibit B. The greater enrollment in middle school programs and the relatively large enrollment in high school production technology programs corresponds roughly to the current teaching assignments of respondents.

Additionally, many respondents indicated they had taught outside of the field of technology education, or outside of public schools, accounting for the large number of years assigned to "Other."

APPENDIX C

Survey item #13: Which of the following do you feel is/was a significant obstacle to your remaining a technology teacher?

Survey item #13 elicited the following write-in responses under "other":

"Lack of support for technological education."

"Not enough classroom experience."

"Maintenance workload expected to be done."

"Health reasons— noise level, hazardous materials, injuries, chemicals."

"Budget cuts."

"No role models, i.e., female Technology Educators."

"Unwillingness of fellow technology education teachers to share resources, info."

"Dictatorial management style of district."

"Abusive students."

"Not enough respect from core teachers."

"Inability or unpreparedness to deal with the complex problems in schools today, i.e., discipline, emotionally disturbed students, lack of family support, etc."

"Elective course instead of a Science credit. As a result, we have very poor #s for next year at (my) HS."

"Desire to obtain administrative experience."

"Too many classes per day."

"Not enough equipment for the 'too many children.'"

"School administration doesn't understand the needs & troubles experienced by Technology/ Vocational teachers."

"Types of students in program. Some students not academically or emotionally ready for class (school delinquency.)"

"Being regarded as a pseudo educator."

"Lack of discipline in the school."

"Tired of extra duties & paperwork. Not enough emphasis on teaching."

"Attitudes that pile up over the years."

"Lack of change in the 18 years I've been in the field."

"Not enough time to do everything I want— more education for me so I can better teach my students."

"Lack of community understanding."

"Desire to see and experience the world."

"Resistance to changes in technology by peers."

"Horrible administration that doesn't like women in non-traditional areas."

"Being able to keep up with new technologies when you can't travel to workshops."

APPENDIX D

Survey item #17: What could be done to attract more females into careers as technology teachers and professors of technology teacher education?

Survey item #17 elicited the following responses:

"Change the curriculum offerings to be more representative of all aspects of technology in society."

"Female role models. Gender-free materials."

"1) Get Guidance Depts. on our side! They need to make girls aware of the opportunities. 2) Market the field at job fairs, on TV, radio. 3) Develop a National Women in Technology Association for professionals in the Technology Education profession already—we could be the main vehicle for changing opinions & promoting our profession, plus be role models."

"Provide clean high technology classrooms and laboratories versus 'shops.' Offer technology to elementary students (K-12)."

"I think that more females would be attracted to technology if the profession moves away from Traditional I.A.-Manual Arts."

"Educate parents and guidance staff."

"Start at the elementary school. Guidance Counselors need to be educated. Educate parents."

"Design-based integrated (interdisciplinary) technology education from kindergarten on, based on better preparation of K-6 teachers to understand and deliver technology."

"1) Allow more females to take classes in H.S. 2) Promote the definition of technology to all teachers."

"Nothing. If they don't enjoy working with their hands, getting a little dirty (which is part of it) it doesn't matter what you do."

"In (my state), technology is taught to all 7th or 8th graders. I think this will help open the field to women."

"Unbiased presentation of curriculum. Encourage more young women in H.S."

"Offer courses to interest females. Give it time to allow for change. Have females in the field do mentoring to get females interested."

"A broader definition of technology and its link between the arts and the sciences. It's overwhelmingly mechanically based and seems irrelevant to most women's lives."

"1) Better informed guidance counselors. 2) Provide support programs for high school students. 3) Offer scholarships, 'internships.'"

"More females enrolling in Technology Education in high school. Recruitment efforts targeting females. Salary incentives. Scholarships."

"The restructuring of Technology Education away from the traditional 'shop' has and probably will have the most effect on attracting females."

"Treat them exactly the same as male students!"

"Provide scholarships."

"Workshops to help better understand Technology Education."

"I used to believe that it was important to start in the middle school (at a young age); and that could still be the best way. But, I have a lot of girls in my program at the middle school, and there are few if any girls in H.S. programs. A female role model may be important to break barriers."

"More P.R. posters, seminars, and workshops for students and teachers. Better knowledge to counselors. Pamphlets on what's available to women & $ careers."

"Technology education being regarded as important by fellow educators."

"1) Stress the technology part and get away from the 'old Industrial Arts stuff.' 2) Women are stereotyped if they are in this field; this must be made a positive thing—not negative."

"Summer workshops for Education majors in college. Summer workshops for girls in high school."

"Recruit more students into secondary technology education programs. Additionally, we need to communicate to all secondary technology education students the need for more technology teachers & the benefits of teaching."

"Grants to help students who are not full-time students."

"Recruit from existing education majors and teachers. Many have expressed interest in the exciting things going on in the profession and were not aware of the program before."

"Double-edged sword. We need more role models, but how do we get the female role models? Maybe national public commercials encouraging females in technology. Maybe more local & national awards for middle school and high school females in Technology Education."

"Recruitment of HS students into technology education programs. Guidance counselors need to be aware of technology education programs."

"Show support at conventions—meetings, etc. Educate guidance counselors."

"Provide workshops/courses to take away the stereotype of the field. Train professors to deal w/women."

"Promotion showing females as teachers."

"Begin in elementary. Recruit like sports. Career fairs featuring non-traditional. Individual mentors w/personal contact. Competitions that include females showcased in schools. Take elementary females to middle school tech labs, middle school females to H.S. vocational lab. H.S. females should experience a field trip to a tech college. Outline course work, help w/financial and application, help w/scholarship, help w/ACT test. Let them stay in a dorm, see bookstore experience college & some tech activities. Put as many successful non-traditional role models before them as possible. Have students hear 'success stories' from individuals who can point out 'what works' and 'what doesn't work' in the field. Women talking to women in a support group."

"At this time, I don't think we should try to attract more people to the field."

"Clarify definition of technology education & link w/early engineering interventions."

"Change the attitudes of male college professors. Technology education has moved away from 'shop' and women have a large number of technological skills that would be beneficial in bringing technology education programs up to date."

"Scholarships, workshops, posting of jobs."

"Have more females in the field come and talk to classes."

"Work on the stereotype of 'Shop teacher.' There are tons of areas that involve technology."

"Raise the pay scale for <u>all</u> teachers."

"1) Change of attitudes of some professors. The 'good ole boy' attitude stinks. 2) Change attitudes of some 'stone age' thinking HS technology teachers. 3) Actually 'market' technology education in an attractive fashion in HS."

"Increase awareness & visibility - video, booklets, etc."

"I'm not sure anything, because some people just aren't cut out to do the type of things we do."

"I don't want to attract girls to Technology Education in its present form—there are reasons why they are saying 'No.' Computerized, pinkified Tech labs don't fool them for long—it is simply Industrial Education 'plugged-in' & a little problem-solving thrown in."

"For males not to be so rude in the field, especially professors."

"Change in attitudes of society."

"Just them knowing there are females in the field."

"Change the attitude that Technology Education is a 'dumping ground' for students. Every misfit is placed in Technology Education because 'we have no other place to put him or her.'"

APPENDIX E

Survey item #18: What should be done to make it easier for female technology teachers to stay in the technology education profession?

Survey item #18 elicited the following responses:

"Support groups. Forum/chances to exchange ideas, problems to reduce the isolation factor. Mentoring programs."

"Recognition from male fellow teachers in technology education."

"Better training in college for maintaining facilities & equipment and for handling discipline, parent contacts, etc. Mentoring programs. Support groups or networks (perhaps via E-mail). More regional meetings where local teachers (male & female) can get together and share. Financial support to attend national conferences & symposia."

"Educate male technology teachers—males in general, to accept women as equals in the field."

"I think that support from other female teachers is a key ... support groups, even support from male teachers."

"Technology Education must change!! The assumptions, beliefs, etc., of Industrial Ed still underlie Technology Education. Is Technology Education for students' needs or industry's needs?"

"The high school labs are still a dumping ground for impossible students. This intimidates many women. New hires are often placed in impossible situations. I know of several women who taught for only a short time & left the field because of impossible situations."

"Provide opportunities for growth in the profession. Give deserving professionals recognition, statewide & nationwide. Provide professional development in areas unique to female Technology Educators. Develop a professional organization for Women in Technology Education. Communication via newsletter, etc."
"Increase & improve staff development on new technologies."

I don't think it is difficult for teachers (either sex) to remain in the technology education profession."

"Promote the females in leadership positions at the state and international levels. Cater to female interests at conferences."

"Reduce bias."

"Changes in the curriculum from traditional industrial arts to technology should make it easier."

"Provide a 'Support Net,' particularly for new teachers."

"Appreciation & support by school staff/leaders. Involvement w/female role models from business & industry in technology-related occupations."

"Check up on the ones employed and have them voice their feelings and proceed to help them solve differences."

"1) Teach some 'good old boys club' skills, i.e., political/social skills from the business world. 2) Invite & 'take' to local, regional, national professional meetings. 3) Establish a local 'buddy' or 'mentor' system. 4) Teach & provide experience in professionalism (TSA, TECA)."

"It would be easier for all if class load sizes were guaranteed."

"More communication between those in the field. A network of info. between them."

"Encouragement by local administration."

"Change the stereotyping of Technology Education/IA as male oriented—if that is possible. Make Technology Education part of required curriculum instead of elective. Integrate it with

Math & Science—they are connected anyway whether taught together or not."

"Begin technology education earlier preschool & elementary school. Revise content to be inclusive of home and family technologies—all technology. Promote the image of women & girls being technologists. Conduct seminars & clinics for the existing professionals (both men & women) about sexism, chilly climates in classrooms, and gender differences."

"If something could be done to have more jobs in the schools. If there is no need or demand for I.S. teachers then why stay!!"

"With the current teacher shortage this should not be a problem. However, if the females do not feel welcomed by the traditional male teachers, they might not stay."

"Get rid of 'good old boys' who hire teachers. Create a network to support."

"We need to be more sensitive to bias."

"Peer support. Females in leadership roles in ITEA & then state organizations."

"1) Find a support structure which allows them to devote the time they need to in their career. (This may be personal choices they make, i.e., will the husband watch the kids?) 2) Help them find employment in progressive schools."

"Get rid of the good old boys, blue collar image of technology."

"Mentors at the university or in secondary schools who can coach through 1st year."

"1) Scholarships to keep updated. 2) Workshops to address various common problems & for sharing. 3) Grants to help female technology teachers improve their programs. 4) Special awards for women technology teachers."

"The same things that need to be done for male Tech teachers plus the establishment of a 'good old GIRL' network!"

"More opportunities for professional development, such as short summer courses on new software & technology."

"Maybe find a way for us to network. I am in contact w/only one other woman who teaches Technology Education. Support from my administrators has been very helpful for me."

"Recognition & support."

"Networking."

"Focus on design & new ideas."

"Let them be more creative."

"Change male professor attitudes. Support groups. More female professors to serve as mentors."

"Be able to dress according to what you are teaching, i.e., if woodworking, wear appropriate pants (khaki, nice jeans, etc.)"

"Help all teachers in general with better pay, appropriate class sizes, cut out the unnecessary stuff & let teachers teach. Also give teachers more help in handling discipline & remove dangerous students from vocational classes."

"I'm not sure; maybe have support groups to encourage female students."

"The same as any other teachers—thoughts: I think it is ridiculous that to be recognized as an outstanding teacher you have to fill out an application yourself! Supervisors should come up with these nominations! I have been made fun of for not knowing some things—which I think a man would not be made fun of—I am extremely competent in my area."

APPENDIX F

Survey item #19: What should be done to improve the enrollment and retention of females in technology education in secondary schools?

Survey item #19 elicited the following responses:

"Provide young girls with role models of females in technology related professions; educate other area teachers as to what technology teachers do (there's a lot of ignorance out there). Guidance Departments need to encourage and recommend technology classes to girls; fight the ridiculous stereotypes about girls who take Technology Education classes, if a girl thinks that she will be the only one in a class of boys, she most usually drops out or never signs up."

"Initiatives K-5 must be developed and technology required 6-8 (middle school) with emphasis on developing TLAs that have neutral appeal, e.g., away from CO_2 cars and other vehicles toward hydroponics, architecture, computer applications."

"Change attitudes of parents."

"Curriculum development w/removal of gender biases. Team teaching to include female faculty in male-dominated Technology Education programs. Involve parents. Start Technology Education at preschool where values are formed & activities may be gender-biased."

"More female teachers—children aspire to what they see."

"Increase awareness of technology classes among females. Bring female middle school or high school students to the university to tour and observe classes."

"Reconceptualize technology as design & technology—much broader, more relevant."

"Get away from the male-oriented project work; make it more gender neutral."

"Education of guidance counselors, parents, administrators and school board members."

"Don't insist all students build 'cars' and 'buildings.' Let more girls take the classes instead of sending them to Home Ec."

"Gear promotional efforts toward females. Offer financial, curricular inventiveness upon graduation. Seek ways to make program more 'Female-Friendly.'"

"Cease using technology classes as the dumping ground for unmotivated, problem students. Require a semester technology class for all students. Require prerequisites for certain technology classes ... this could sift out underachievers. Market your program to targeted groups ... i.e., physics, art ... ."

"We are offering a Technology Camp for females to generate interest in Technology Education."

"Role models are the most beneficial. We use recruitment videos from Tech Camp showing females in technology areas. Also, working with guidance counselors and parents to help them overcome gender bias has helped our school system."

"Have more electives available. Make work (lab) area more neutral—less masculine looking. Female role models or invite females in non-traditional areas in community to come speak. Advertise (recruit) as an applied Science & Math, and not 'shop.'"

"Have segregated classes—the boys are too rough in middle school and intimidate the girls."

"Focus girls on their strong points, i.e., ability to organize, ability to work with a team, ability to concentrate on details."

"Curriculum must be user-friendly to both females & males—must continue to build the curriculum and keep it relevant to students' needs."

"We need to work on our society & when that occurs, more females will feel more comfortable in any field."

"Improve support from home; a little dirt and hard work has never harmed anyone. More definition of technology education in the elementary school; it's more than using a computer, which is what many elementary teachers think."

"The girls should be made to feel successful. Don't let the boys overshadow them. Also, boys have been showing an increase in disrespect for girls in the last few years. Don't let it happen in the classroom."

"Relate to career goals, teach using projects and activities that don't only look like 'boy things.'"
"1) Implement classes that are technology oriented but not so 'dirty'—graphic arts 'crafts' and use these to get them into other areas. 2) Clean up physical labs so they are appealing. 3) Clean up foul language and attitudes. 4) Introduce technology at a younger age."

"That shops don't have to be dirty, and only appropriate talk should be used, whether a female is present or not. Male and female rest rooms are close by the class. The girls need to leave femininity at the shop door and boys their masculinity."

"High expectations. Give leadership opportunities."

"Increase the number of female instructors. Make the curriculum lively and interesting—include some traditional female subjects/ projects in the class."

APPENDIX G

Survey item #20: Other issues of special concern to females in technology education

"Our sexuality should not be examined. If we (females) are mechanical/technically inclined, then so be it. Females in our society are taught at an early age to work with & cooperate with others. Girls are much more successful in math until H. S. Get rid of bias toward smart females. Allow them to excel/explore whatever their interests are."

"Target committee for female teachers to report prejudiced behavior of administrators and other teachers."

"It is my personal opinion that teachers in technology education should have Industrial backgrounds and knowledge. The elementary [teaching] aspect of technology education is not being addressed properly, and [the students'] information will be bias simply because elementary teachers are not required to have any technology/industrial courses throughout college."

"Two weeks ago I received a RIF notice after 9 years teaching. It is all due to other teachers not promoting Technology Education. Many older teachers believe they have the best & only program. They are not willing to change. It forces people to other areas to make a living."

"Unintentionally we send messages all the time to girls that they don't belong. Teachers talk about the boys—oh, and girls, protective equipment doesn't fit, projects that are exciting & familiar in a boy's world."

"Since males dominate the area, they will have to become more receptive/encouraging toward females. This includes myself since I do not fit the stereotypical female. Strategies that can be used include 1) Attend games/organized sports—for females (girls basketball). 2) Have industrial technology teachers get into other classes so females get to know who they are. 3) Work at including females from study halls in 'special projects' you need done. 4) Include pictures of females in all printed matter."

"I do not believe you must be a certified industrial arts or technology teacher to teach communications, electronics, modular technology-based classes, Graphics or Production. Science majors with computer skills or just a real solid facilitator or technician can now teach in what was previously an older 'shop' curriculum."

"Gender bias starts when children are still in diapers; a change in societal views will be necessary to really make a difference. There are, however, inherent differences in girls and boys, and there will be many girls who will simply not have interest in some areas of technology education in school. Band, foreign language, arts, or some other area may win out when there are limited elective choices."

"Most of the industrial technology classes are being phased out in [my state]. A smart person would choose another field. If you find a position teaching—you are stuck with whatever they want to do to you and your pay."

"I feel a class on discipline—how to handle male students may help females. I had no idea what was in store for me when I began and you'd better believe the boys tried every trick in the book."

ATTACHMENT 1

Survey Instrument

Survey of Women in Technology Education

Please return this questionnaire in the postage-paid envelope to: Dr. Jim Flowers, Occupational and Technical Studies, 108 Technology Bldg., Old Dominion University, Norfolk, VA 23529. If you have any questions, please call (804) 683-4305.

1. Please indicate which college degrees you have completed or are presently working toward:

Completed	Working Toward		Major	Year Awarded
☐	☐	Associate's	_____	_____
☐	☐	Baccalaureate	_____	_____
☐	☐	Master's	_____	_____
☐	☐	Doctorate	_____	_____
☐	☐	(other, please specify)	_____	_____

2. Are you licensed or officially certified to teach Technology Education? YES: ☐ NO: ☐

3. What is your present job title? _____

4. If you have any other careers, please list them. _____

5. Did you previously or do you presently teach the following:

Previously Taught	Presently Teach	
☐	☐	Technology Education in a middle school or junior high school
☐	☐	Technology Education in a high school
☐	☐	Technology Teacher Education at a college
☐	☐	technical, trade or industrial education
		other (specify) _____

6. How many years have you taught in each of the following areas:

____ General overview of all technology
____ Communication related technologies
____ Production related technologies
____ Transportation related technologies
____ Energy technologies
____ Other (please specify) _____
____ Other (please specify) _____

7. Why did you decide to become a Technology teacher?

t what point in your life did you decide to become a Technology teacher?

9. Did you take any Technology or Industrial Arts classes in grades 6-12? YES: ❒ NO: ❒

9a. If the answer to item 9 was YES, please identify these Technology or IA courses you took.

9b. If the answer to item 9 was NO, please explain the major reasons why you did not take Technology Education or Industrial Arts in grades 6-12.

10. Who gave you the most support in your decision to become a Technology teacher?

11. Who or what was the biggest obstacle you faced in becoming a Technology teacher?

12. Overall, how much of a negative or positive influence is/was each of the following in your path to **becoming** a Technology teacher. (Please circle only one number in a row.)

Influence on your becoming a Technology Teacher

NEGATIVE		NEUTRAL or NO INFLUENCE		POSITIVE	
-2	-1	0	+1	+2	Mother
-2	-1	0	+1	+2	Father
-2	-1	0	+1	+2	Sister(s)
-2	-1	0	+1	+2	Brother(s)
-2	-1	0	+1	+2	Your children
-2	-1	0	+1	+2	Spouse or significant other
-2	-1	0	+1	+2	Other family members
-2	-1	0	+1	+2	Friends
-2	-1	0	+1	+2	Elementary school teachers
-2	-1	0	+1	+2	Middle school Technology teachers
-2	-1	0	+1	+2	High school Technology teachers
-2	-1	0	+1	+2	Other middle & high school teachers
-2	-1	0	+1	+2	Guidance counselors
-2	-1	0	+1	+2	Female high school students
-2	-1	0	+1	+2	Male high school students
-2	-1	0	+1	+2	College professors in Technology Education
-2	-1	0	+1	+2	Other college professors
-2	-1	0	+1	+2	College advisors
-2	-1	0	+1	+2	Undergraduate students
-2	-1	0	+1	+2	Graduate students
-2	-1	0	+1	+2	Supervisor at work
-2	-1	0	+1	+2	Co-workers
-2	-1	0	+1	+2	Support group
-2	-1	0	+1	+2	Role model (specify) _____
-2	-1	0	+1	+2	Other (specify) _____
-2	-1	0	+1	+2	Other (specify) _____

13. Which of the following factors do you feel is/was a **significant obstacle** to your **becoming** a Technology teacher? (Check all that apply.)

- ☐ The particular technology classes taught in college.
- ☐ Insufficient funding while in college.
- ☐ Family responsibilities, such as the need for child-care.
- ☐ The gender-stereotype of male Technology teachers.
- ☐ Lab or shop work involving noise, hazardous materials, or dangerous processes.
- ☐ Little or no Technology Education in high school.
- ☐ The need to work and earn money.
- ☐ Transportation to the college.
- ☐ Certification requirements.
- ☐ Finding and getting a job.
- ☐ Lack of awareness about the field.
- ☐ Attitudes of male classmates in high school or college.
- ☐ Other (specify) _____
- ☐ Other (specify) _____
- ☐ Other (specify) _____

14. Compared to males, do you think that in general it is easier or more difficult for a female to get a job as a Technology Education or Industrial Arts teacher in secondary schools?

Easier: ☐ No difference: ☐ More Difficult: ☐

15. Overall, how much of a negative or positive influence is/was each of the following in your **remaining** a Technology teacher. (Please circle only one number in a row.)

Influence on your remaining a Technology Teacher

NEGATIVE		NEUTRAL or NO INFLUENCE		POSITIVE	
-2	-1	0	+1	+2	Mother
-2	-1	0	+1	+2	Father
-2	-1	0	+1	+2	Sister(s)
-2	-1	0	+1	+2	Brother(s)
-2	-1	0	+1	+2	Your children
-2	-1	0	+1	+2	Spouse or significant other
-2	-1	0	+1	+2	Other family
-2	-1	0	+1	+2	Friends
-2	-1	0	+1	+2	School administrator
-2	-1	0	+1	+2	Fellow Technology teachers
-2	-1	0	+1	+2	Fellow teachers (not Technology)
-2	-1	0	+1	+2	Your students
-2	-1	0	+1	+2	Other (specify) _____
-2	-1	0	+1	+2	Other (specify) _____
-2	-1	0	+1	+2	Other (specify) _____
-2	-1	0	+1	+2	Other (specify) _____

16. Which of the following factors do you feel is/was a **significant obstacle** to your **remaining** a Technology teacher? (Check all that apply.)

- ☐ Excessive workload.
- ☐ Greater financial needs.
- ☐ Family responsibilities.
- ☐ Promotion.
- ☐ Geographic relocation.
- ☐ Plans to marry or have children.
- ☐ Not enough professional support.
- ☐ Other (specify) _____
- ☐ Other (specify) _____
- ☐ Other (specify) _____

17. What could be done to attract more females into careers as Technology teachers and professors of Technology Teacher Education?

18. What should be done to make it easier for female Technology teachers to stay in the Technology Education profession?

19. What should be done to improve the enrollment and retention of females in Technology Education in secondary schools?

20. This questionnaire might not have uncovered enough of your thoughts and experiences because of how the particular questions were asked. Please discuss, as you see fit, any of the issues mentioned above, or any other issues that might be of special concern to females in Technology Education.

Thank you very much for completing this questionnaire.

Note: If you would be interested in a symposium/conference on women in technology education and other equity issues in technology education, please write your name, affiliation, address and phone number below:

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