

Calendar Year 2003 Bachelor's Degree Recipients Alumni Survey

Technical Fluency

Background

On January 21, 2000 the Education Policy Committee recommended that the University System of Maryland Board of Regents adopt a draft resolution mandating that all USM graduates depart the university system demonstrating technical fluency.¹ Subsequently, on August 22, 2000, USM Board of Regents Education Committee outlined the elements of technical fluency that were borrowed from a report published by the National Research Council entitled, "Being Fluent with Information Technology." Using NRC's three general competency areas (skills, concepts, and intellectual capabilities) as guidelines, the Education Policy Committee's working group established 17 competencies that USM graduates ought to demonstrate. In September 2000 each USM institution was advised to develop a report describing how the institution would ensure each student graduated with the core technological fluency competencies. On March 1, 2001 UMBC published its response to the USM Board of Regents outlining its proposed agenda to ensure technical fluency.² These initiatives prompted the UMBC IT Steering Committee, working with the Office of Institutional Research (OIR), to integrate technical fluency items into the One-Year Follow-up Survey of FY2001 bachelor's degree recipients. The IT Steering Committee subsequently revised the 2001 technical fluency survey items for the survey of CY2003 bachelor's degree recipients.^{3,4}

Data & Methods

In Spring 2004, the Office of Institutional Research conducted a one-year follow-up survey of the 1,772 alumni who received a bachelor's degree in calendar year 2003. Three mailings of the survey resulted in a response rate of 23.5% and a final sample of 416 respondents.⁵ As part of this survey, alumni were asked to respond to a series of questions addressing UMBC's contribution to their acquisition of technical fluency.

The seven items used here represent technical fluency, as outlined by the Education Policy Committee's working group. Please refer to Table 1 for a listing of the 2004 technical fluency survey items and examples of each. Alumni were asked if and when they acquired certain computer skills and technical knowledge to gauge the extent to which their UMBC education contributed to their technical fluency. Respondents could reply that they learned a particular skill or developed certain technical knowledge (a) before attending UMBC, (b) during their time at UMBC, (c) after leaving UMBC, or that (d) they still did not know how to perform certain computer-related tasks or they did not possess particular technical knowledge.

Findings

Matriculation Type

Table 2, and two accompanying figures, display summary data regarding if and when alumni attained a variety of technical skills and knowledge as a result of their formal or informal educational experiences at UMBC. It is important to understand when and where students developed these technical skills and knowledge, and to what extent UMBC had a role in this, given educational policy adopted by USM Board of Regents.

¹ <http://www.gl.umbc.edu/it/it-plans.shtml>. The link is displayed as "BOR Resolution on Student Technology Fluency" (January 21, 2000). Accessed on May 23, 2005.

² Reference "Strategic Planning Report" at <http://www.umbc.edu/provost/planning/index.html>.

³ Please note, the technical fluency items in the 2004 Questionnaire for CY2003 UMBC Recent Bachelor's Degree Recipients were revised to more accurately reflect the 17 competencies outlined in the August 2000 USM Board of Regents Education Policy Committee memo. Results from the 2002 Questionnaire for FY2001 UMBC Recent Bachelor's Degree Recipients are not comparable to the 2004 Questionnaire for CY2003 UMBC Recent Bachelor's Degree Recipients because the items and response categories are different from year-to-year.

⁴ CY2003 versus FY2003 bachelor's degree recipients were examined due to datafile issues.

⁵ An incentive was offered as a strategy to increase participation.

Four general patterns emerged from these data. First, alumni revealed they were much more likely to develop technical fluency prior to matriculating to UMBC or while attending UMBC, and much less likely to develop these skills and knowledge one-year out of college. Second, in some cases alumni have yet to acquire certain technical skills and knowledge; these alumni tended to have majored in the Social Sciences and Arts & Humanities (see Table 3). Third, alumni who transferred into UMBC were more likely than alumni who enrolled as new freshmen to report attaining technical skills and knowledge prior to enrolling at UMBC. Fourth, alumni who enrolled as new freshmen were more apt to attribute their development of more sophisticated technical skills and knowledge (i.e., using a computer to analyze and display information, learning online, and understanding the social and ethical implications of technology) to their educational experiences at UMBC.⁶ Ultimately, these findings highlight the fact that educational institutions are important socialization agents facilitating the acquisition of technical fluency.

The data in Table 2 show that at least half of all alumni commented that they learned how to (a) set up a computer (71%), (b) find and evaluate information on the Internet (69%), (c) develop and share documents and presentations using the computer (60%), and secure a computer and one's personal privacy (50%) prior to matriculating to UMBC. Alumni were more likely to respond that they acquired those skills before attending UMBC regardless of matriculation type (new freshman v. new transfer). Alumni also reported that UMBC's contribution to the development of these skills was noteworthy. Not surprisingly, alumni who enrolled as new freshmen more frequently reported that they learned the aforementioned skills while at UMBC than did alumni who transferred into UMBC. Of note, 14% of alumni expressed that they still did not know how to "secure a computer and their personal privacy."

Alumni credited their experiences at UMBC with facilitating their "use of computers to analyze or display information" (41%). One-fifth (21%) of all respondents confessed they still did not understand or know how to use a computer to analyze or display information (Table 2).

Slightly under half of all participants responded they had online learning experiences before coming to UMBC (48%), while another 42% commented they had their first online learning experience while at UMBC (Table 2). Transfers, of course, were more likely to have experienced online learning before matriculating to UMBC (56% vs. 40%). Conversely, alumni who enrolled as new freshmen were more likely to report that their first online learning experience occurred while at UMBC (50% vs. 34%). Almost equal percentages of alumni commented that they learned the social and ethical implications of technology prior to coming to UMBC (41%) or during their time at UMBC (42%).

Program Area

Table 3 illustrates the extent of UMBC's contribution to the development of alumni's technical fluency by program area.⁷ Although data for Interdisciplinary Studies alumni are shown, the small number of graduates ($n = 8$) in this program does not support their inclusion in these comparisons. A distinct pattern emerged among Engineering, Computer & Information Sciences and Math & Sciences alumni, in that they were generally more likely than other alumni to report acquiring these technical skills and knowledge prior to coming to UMBC. No doubt this is due, in part, to their intellectual curiosity and interest in science and technology. Still, Engineering, Computer & Information Sciences alumni reported that more specialized technical skills and knowledge were developed at UMBC. For instance, Engineering, Computer & Information Systems alumni were more likely than other alumni to report that they learned how to "secure a computer and personal privacy" while at UMBC (34.2%).⁸ No doubt this alumni group's response was

⁶ Chi-square tests were conducted to assess the relationship between technical fluency and matriculation type. "Setting up a personal computer" ($p \leq .01$), "securing a computer and personal privacy" ($p \leq .05$), and "learning online" ($p \leq .01$) were all significantly related to matriculation type. Please see Table 2.

⁷ The distribution of respondents by program area is representative of all CY 2003 bachelor's degree recipients. Please see Table 2 "Calendar Year 2003 Bachelor's Degree Recipients Alumni Survey Characteristics" in the report entitled, "Calendar Year 2003 Bachelor's Degree Recipients One-Year Follow-Up Alumni Survey" for comparisons between respondents and all CY2003 bachelor's degree recipients.

⁸ Chi-square tests were conducted to assess the relationship between technical fluency and program area. Most of the relationships could not be assessed for statistical significance because greater than 20% of the cells had $n < 5$, violating a key assumption of the Chi-square statistic. "Securing a computer and personal privacy" ($p \leq .01$) was significantly related to program area. Please see Table 3.

influenced by the content of their academic program. Over half of Engineering & Computer Information Sciences (54.5%) and approximately 40% of Math & Sciences (44.4%) and Social Sciences (39.2%) alumni were more likely than Arts & Humanities alumni (25.6%) to report they learned how to “use a computer to analyze or display information” while at UMBC.

Of the four program areas, Social Sciences alumni (38.5%) were most likely to report that UMBC contributed to their learning how to “develop and share presentations,” including how to create and electronically share word processing documents and graphical presentations. Arts & Humanities (31.8%), Engineering, Computer & Information Sciences (32.2%), and Math & Sciences (30.9%) alumni were almost equally as likely to report that their experiences at UMBC contributed to this technical competency.

Compared to the other program areas, Arts & Humanities alumni (20.9%) were least likely to have responded that UMBC helped them “find and evaluate information on the Internet,” whereas Social Sciences (36.4%) and Math and Science (34.5%) alumni were the most likely to report that their formal and informal experiences at UMBC contributed to their development of this technical fluency. Compared to other disciplines, Social Sciences alumni (46.8%) were also most likely to report that they learned to “understand the social and ethical implications of technology,” followed by Engineering, Computer & Information Sciences (42.1%) and Arts & Humanities alumni (41.2%). Finally, Social Sciences (48.6%) and Arts & Sciences (40.7%) alumni were more likely to report that they learned online, whereas Engineering & Computer Information Sciences as well as Math & Sciences alumni were equally less likely to have experienced this while at UMBC (36.4% each) (Table 3).

Gender

When investigating graduates’ technical fluencies, it is imperative to understand the relationships among gender, program area, and technical fluency for a couple of reasons. First, female graduates were about one-third as likely as male graduates to have majored in Engineering, Computer & Information Sciences (17.1% v. 48.7%). Instead, female graduates were almost twice as likely as male graduates to have majored in the Arts & Humanities (25.2% v. 13.3%) or the Social Sciences (42.6% v. 22.8%).⁹ Second, prior results indicated that Engineering, Computer and Information Sciences alumni reported being technically fluent in areas as a byproduct of their intellectual interest, education, and training, while alumni who majored in the Arts & Humanities and Social Sciences disciplines were more likely than other alumni to report having yet acquired certain technical fluencies. Ultimately, the “Interim Policy on Technology Fluency” (February 2002) mandated that UMBC is not only responsible for instituting programming that will facilitate the acquisition of general technology fluency, but each academic department is also responsible for ensuring students graduate with discipline appropriate technical skills and knowledge. Thus, we must understand if there is a gender gap in technical fluency, and the extent to which program area is implicated in that relationship.

Table 5 illustrates the relationship between gender and technical fluency. Three of the seven relationships between gender and technical fluency were statistically significant. First, gender and alumni’s fluency in “setting up a personal computer” was statistically significant. While females were less likely than males (80% v. 66%) to have learned to do this task prior to matriculating to UMBC, they did report picking up these skills while at UMBC (24%). Second, there was a statistically significant relationship between gender and alumni’s ability to “secure a computer and personal privacy” ($p \leq .001$). Results suggest a gender gap in this technical competency. Whereas male and female graduates were equally as likely to report learning this skill at UMBC (~28%), males were much more likely than females to report having this skill prior to coming to UMBC (60% v. 44%), while females were more likely than males to report having not yet acquired this competency (20% v. 5%).

A very similar pattern emerged for the relationship between gender and alumni’s reported ability to “use a computer to analyze or display information.” There was a statistically significant relationship between gender and this technical fluency ($p \leq .001$). Whereas male and female graduates were equally as likely to report learning this skill at UMBC (~41%), males were much more likely than females to report having this

⁹ The relationship between gender and program area is statistically significant ($p \leq .001$).

skill prior to coming to UMBC (47% v. 27%), while females were more likely than males to report having not yet attained this competency (27% v. 11%).

Looking more closely, we can understand the relationship among gender, program area, and technical fluency in Table 6.¹⁰ Knowing that females were more likely than males to have majored in the Arts & Humanities and Social Sciences and that alumni in those program areas were less likely to have acquired the aforementioned competencies (securing a computer and personal privacy; using a computer to display information), evidence suggested that alumni fell short of these standards, in part, because of curriculum differences in one's program area. Specifically, male and female alumni in the Arts & Humanities and the Social Sciences were *both* likely to report *not* having yet attained these technical fluencies, while females tended to more frequently report this. However, a greater gender disparity occurred within Engineering, Computer & Information Sciences and Math & Sciences, in that, female graduates were more likely than male graduates to report they had *not* yet attained these skills.¹¹

Concluding Remarks

Overall, these findings emphasized the important role educational institutions have in exposing students to technical skills and knowledge to strengthen their computer literacy in everyday life as well as bolster their competitive edge when on the job market. Generally, alumni reported that they acquired technical skills and knowledge before coming to UMBC or during their time at UMBC. Indeed, all alumni credited UMBC with helping them develop technical fluency in the selected areas, but alumni who enrolled as new freshmen were more likely than alumni who transferred in to report that their experiences at UMBC helped them attain more specialized technical skills and knowledge. Results suggested there is a slight gender gap in technical fluency, but the data do not permit us to draw any definitive conclusions.

¹⁰ Although a distinct pattern emerged among gender, program type, and technical fluency, Chi-square tests of significance could not be conducted to assess the significance of these relationships because greater than 20% of the cell sizes were less than 5. This violates one of the key assumptions of the Chi-square statistic.

¹¹ See Table 6. Although Chi-square tests of significance could not be conducted due to too many small cell sizes, one can reference the gendered patterns by examining the highlighted areas.

Table 1: Technical Fluency Items and Examples

Technical Fluency Survey Item	Examples
Set up a personal computer	<ul style="list-style-type: none">• Connect hardware• Install software• Connect to a network• Organize files• Print documents
Secure a computer and your personal privacy	<ul style="list-style-type: none">• Install or update anti-virus or e-mail spam software• Operating system updates, secure passwords, SSN and identifying information
Develop and share documents and presentations	<ul style="list-style-type: none">• Word processing• Add graphics to presentations• Deliver documents or presentations in person or share electronically
Use a computer to analyze or display information	<ul style="list-style-type: none">• Write a computer program, task or spreadsheet macro• Create/publish a Web page
Find and evaluate information on the Internet	<ul style="list-style-type: none">• Use search engines• Distinguish and cite reliable online sources for research
Learn online	<ul style="list-style-type: none">• Understand built-in software manuals• Self-paced tutorials• Query others via e-mail or discussion forums
Understand social and ethical implications of technology	<ul style="list-style-type: none">• Use of personal information, health records, ethnicity, gender, income, etc.

**Calendar Year 2003 Bachelor's Degree Recipients Alumni Survey
TECHNICAL FLUENCY BY MATRICULATION TYPE**

TABLE 2: PLEASE INDICATE IF AND WHEN YOU ATTAINED THE FOLLOWING SKILLS AND UNDERSTANDING AS A RESULT OF YOUR FORMAL OR INFORMAL EDUCATIONAL EXPERIENCE AT UMBC (BY MATRICULATION TYPE)															
	I learned this before attending UMBC			I learned this during my time at UMBC			I learned this after leaving UMBC			I don't understand or know how to do this			Grand Totals		
	NF	NT	Total	NF	NT	Total	NF	NT	Total	NF	NT	Total	NF	NT	Total
Set up a personal computer **	132	163	295	56	29	85	6	6	12	7	14	21	201	212	413
	<i>66%</i>	<i>77%</i>	71%	<i>28%</i>	<i>14%</i>	21%	<i>3%</i>	<i>3%</i>	3%	<i>3%</i>	<i>7%</i>	5%			100%
Secure a computer and personal privacy *	87	117	204	71	46	117	13	18	31	28	31	59	199	212	411
	<i>44%</i>	<i>55%</i>	50%	<i>36%</i>	<i>22%</i>	29%	<i>7%</i>	<i>8%</i>	8%	<i>14%</i>	<i>15%</i>	14%			100%
Develop and share documents and presentations	113	133	246	78	64	142	5	6	11	4	9	13	200	212	412
	<i>57%</i>	<i>63%</i>	60%	<i>39%</i>	<i>30%</i>	34%	<i>3%</i>	<i>3%</i>	3%	<i>2%</i>	<i>4%</i>	3%			100%
Use a computer to analyze or display information	62	82	144	93	77	170	4	7	11	42	45	87	201	211	412
	<i>31%</i>	<i>39%</i>	35%	<i>46%</i>	<i>36%</i>	41%	<i>2%</i>	<i>3%</i>	3%	<i>21%</i>	<i>21%</i>	21%			100%
Find and evaluate information on the Internet ^a	135	149	284	65	57	122	1	3	4	0	3	3	201	212	413
	<i>67%</i>	<i>70%</i>	69%	<i>32%</i>	<i>27%</i>	30%	<i>0%</i>	<i>1%</i>	1%	<i>0%</i>	<i>1%</i>	1%			100%
Learn online **	80	118	198	100	71	171	7	6	13	14	16	30	201	211	412
	<i>40%</i>	<i>56%</i>	48%	<i>50%</i>	<i>34%</i>	42%	<i>3%</i>	<i>3%</i>	3%	<i>7%</i>	<i>8%</i>	7%			100%
Understand social and ethical implications of technology	73	95	168	92	78	170	11	8	19	23	26	49	199	207	406
	<i>37%</i>	<i>46%</i>	41%	<i>46%</i>	<i>38%</i>	42%	<i>6%</i>	<i>4%</i>	5%	<i>12%</i>	<i>13%</i>	12%			100%

Notes:

NF = New Freshmen; NT = New Transfers

*Percentages in *italic* represent the proportion of NF and NT who responded "learned before," "learned during," "learned after," or "do not know" for each item .

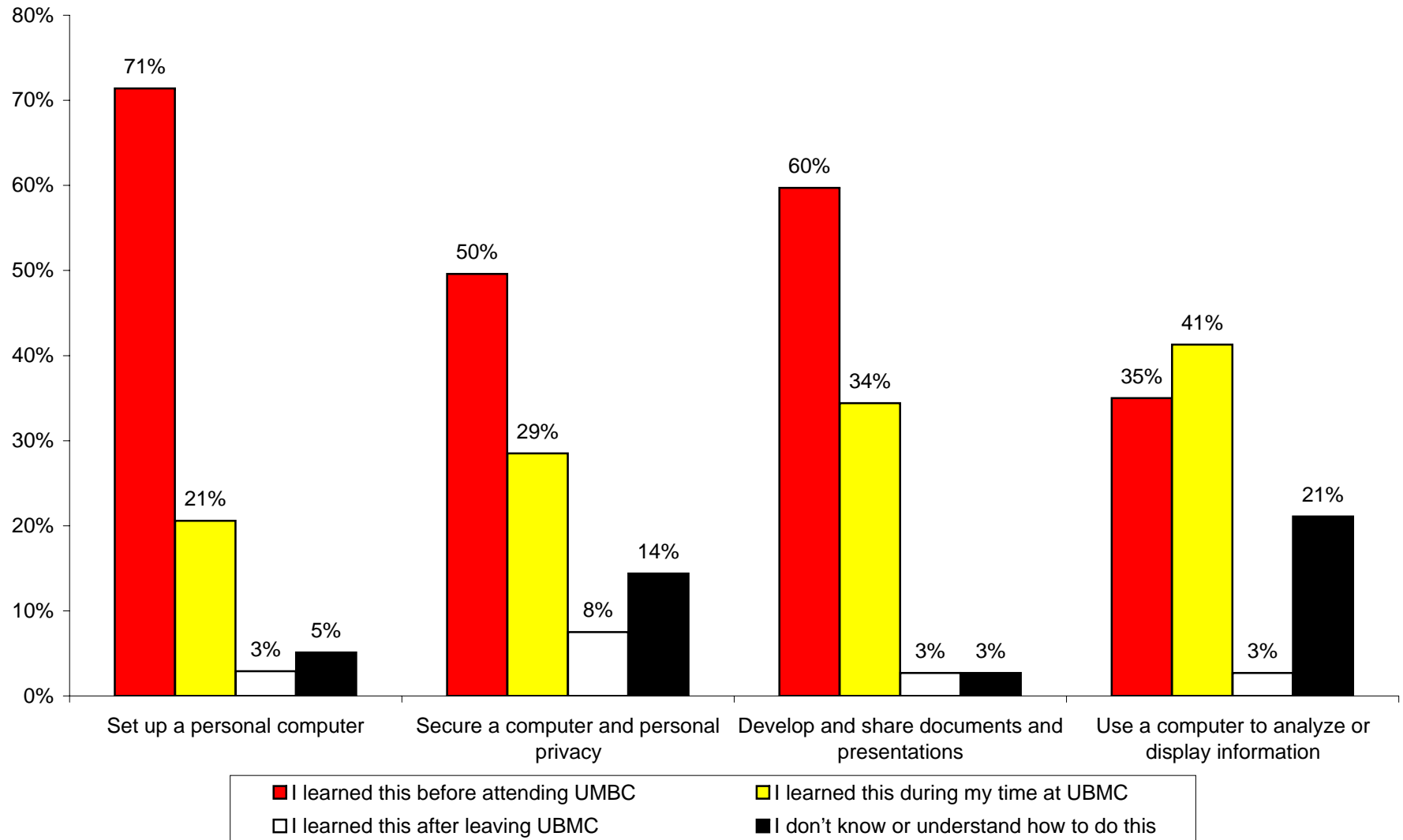
*Percentages in **bold** represent the proportion of alumni who responded "learned before," "learned during," "learned after," or "do not know" for each item.

^a Chi-square tests assessing the relationship between technical fluency and matriculation type could not be conducted

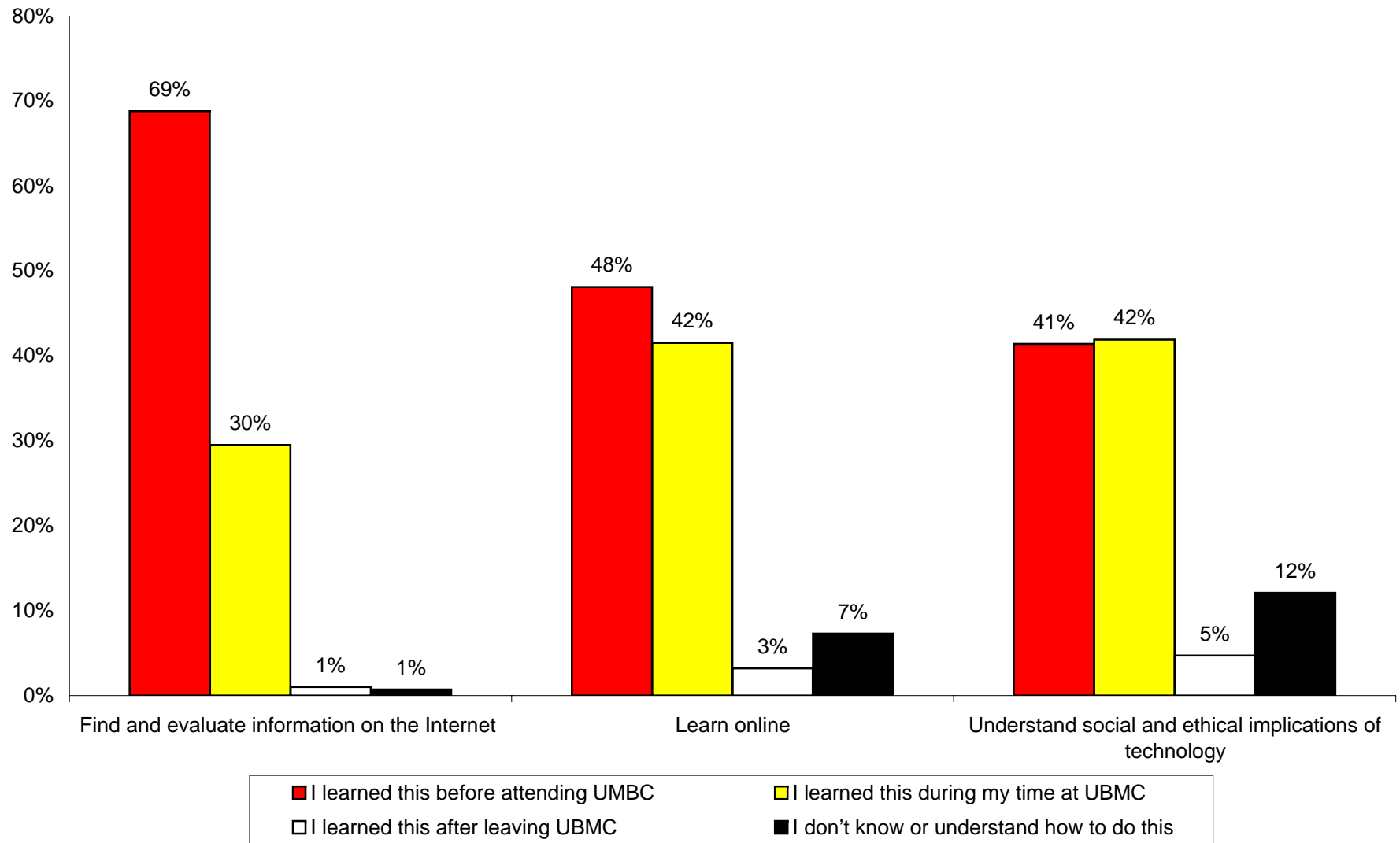
because the proportion of cell sizes less than 5 is > 20%. This violates one of the assumptions associated with the Chi-square test.

** p < .01; * p < .05. There is a significant relationship between technical fluency and matriculation type.

UMBC Survey of Calendar Year 2003 Bachelor's Degree Recipients: Attainment of Technological Skills & Understanding



UMBC Survey of Calendar Year 2003 Bachelor's Degree Recipients: Attainment of Technological Skills & Understanding



**Calendar Year 2003 Bachelor's Degree Recipients Alumni Survey
TECHNICAL FLUENCY BY PROGRAM AREA**

TABLE 3: PLEASE INDICATE IF AND WHEN YOU ATTAINED THE FOLLOWING SKILLS AND UNDERSTANDING AS A RESULT OF YOUR FORMAL OR INFORMAL EDUCATIONAL EXPERIENCE AT UMBC (PERCENT RESPONDING BY PROGRAM AREA)																				
	Arts & Humanities (n = 86)				Engineering, Computer & Info. Sciences (n = 121)				Social Sciences (n = 143)				Math & Sciences (n = 55)				Interdisciplinary Studies (n = 8)			
	B	D	A	DK	B	D	A	DK	B	D	A	DK	B	D	A	DK	B	D	A	DK
Set up a personal computer ^a	65.1	23.3	4.7	7.0	76.9	20.7	1.7	0.8	66.4	21.7	2.8	9.1	83.6	10.9	3.6	1.8	62.5	37.5	0.0	0.0
Secure a computer and personal privacy ^{**}	43.5	28.2	9.4	18.8	56.7	34.2	7.5	1.7	46.9	25.9	5.6	21.7	52.7	23.6	9.1	14.5	37.5	25.0	12.5	25.0
Develop and share documents and presentations ^a	60.0	31.8	3.5	4.7	65.3	32.2	2.5	0.0	53.8	38.5	2.8	4.9	65.5	30.9	1.8	1.8	37.5	50.0	0.0	12.5
Use a computer to analyze or display information ^a	30.2	25.6	5.8	38.4	43.0	54.5	1.7	0.8	27.3	39.2	1.4	32.2	44.4	44.4	0.0	11.1	37.5	25.0	25.0	12.5
Find and evaluate information on the Internet ^a	74.4	20.9	2.3	2.3	73.6	25.6	0.8	0.0	62.2	36.4	0.7	0.7	65.5	34.5	0.0	0.0	75.0	25.0	0.0	0.0
Learn online ^a	51.2	40.7	0.0	8.1	56.2	36.4	4.1	3.3	35.9	48.6	4.9	10.6	58.2	36.4	1.8	3.6	37.5	37.5	0.0	25.0
Understand social and ethical implications of technology	36.5	41.2	4.7	17.6	43.8	42.1	5.8	8.3	38.1	46.8	4.3	10.8	50.0	29.6	3.7	16.7	57.1	42.9	0.0	0.0

NOTE: B= "I learned this before attending UMBC"; D= "I learned this during my time at UMBC"; A=" I learned this after leaving UMBC";

DK=" I don't understand or know how to do this"

^a Chi-square tests assessing the relationship between technical fluency and program area could not be conducted because the proportion of cell sizes less than 5 is > 20%. This violates one of the assumptions associated with the Chi-square test.

^{**} p < .01. There is a significant relationship between program type and technical fluency.

**Calendar Year 2003 Bachelor's Degree Recipients Alumni Survey
TECHNICAL FLUENCY BY GENDER**

TABLE 5: PLEASE INDICATE IF AND WHEN YOU ATTAINED THE FOLLOWING SKILLS AND UNDERSTANDING AS A RESULT OF YOUR FORMAL OR INFORMAL EDUCATIONAL EXPERIENCE AT UMBC (BY GENDER)															
	I learned this before attending UMBC			I learned this during my time at UMBC			I learned this after leaving UMBC			I don't understand or know how to do this			Grand Totals		
	M	F	Total	M	F	Total	M	F	Total	M	F	Total	M	F	Total
Set up a personal computer *	125	170	295	24	61	85	4	8	12	4	17	21	157	256	413
	<i>80%</i>	<i>66%</i>	71%	<i>15%</i>	<i>24%</i>	21%	<i>3%</i>	<i>3%</i>	3%	<i>3%</i>	<i>7%</i>	5%			100%
Secure a computer and personal privacy ***	93	111	204	44	73	117	11	20	31	8	51	59	156	255	411
	<i>60%</i>	<i>44%</i>	50%	<i>28%</i>	<i>29%</i>	29%	<i>7%</i>	<i>8%</i>	8%	<i>5%</i>	<i>20%</i>	14%			100%
Develop and share documents and presentations ^a	102	144	246	48	94	142	4	7	11	3	10	13	157	255	412
	<i>65%</i>	<i>56%</i>	60%	<i>31%</i>	<i>37%</i>	34%	<i>3%</i>	<i>3%</i>	3%	<i>2%</i>	<i>4%</i>	3%			100%
Use a computer to analyze or display information ***	74	70	144	63	107	170	3	8	11	17	70	87	157	255	412
	<i>47%</i>	<i>27%</i>	35%	<i>40%</i>	<i>42%</i>	41%	<i>2%</i>	<i>3%</i>	3%	<i>11%</i>	<i>27%</i>	21%			100%
Find and evaluate information on the Internet ^a	114	170	284	41	81	122	1	3	4	1	2	3	157	256	413
	<i>73%</i>	<i>66%</i>	69%	<i>26%</i>	<i>32%</i>	30%	<i>1%</i>	<i>1%</i>	1%	<i>1%</i>	<i>1%</i>	1%			100%
Learn online	84	114	198	60	111	171	5	8	13	7	23	30	156	256	412
	<i>54%</i>	<i>45%</i>	48%	<i>38%</i>	<i>43%</i>	42%	<i>3%</i>	<i>3%</i>	3%	<i>4%</i>	<i>9%</i>	7%			100%
Understand social and ethical implications of technology	72	96	168	63	107	170	6	13	19	16	33	49	157	249	406
	<i>46%</i>	<i>39%</i>	41%	<i>40%</i>	<i>43%</i>	42%	<i>4%</i>	<i>5%</i>	5%	<i>10%</i>	<i>13%</i>	12%			100%

Notes:

M = Male, F = Female

*Percentages in *italic* represent the proportion of M and F in each cell. Percentages in **bold** represent the proportion of alumni who responded "learned before," "learned during," "learned after," or "do not know" for each item.

^a Chi-square tests assessing the relationship between technical fluency and matriculation type could not be conducted

because the proportion of cell sizes less than 5 is > 20%. This violates one of the assumptions associated with the Chi-square test.

*** p < .001; ** p < .01; * p < .05. There is a significant relationship between technical fluency and gender.

**Calendar Year 2003 Bachelor's Degree Recipients Alumni Survey
TECHNICAL FLUENCY BY PROGRAM AREA AND GENDER**

TABLE 6: PLEASE INDICATE IF AND WHEN YOU ATTAINED THE FOLLOWING SKILLS AND UNDERSTANDING AS A RESULT OF YOUR FORMAL OR INFORMAL EDUCATIONAL EXPERIENCE AT UMBC (PERCENT RESPONDING BY PROGRAM AREA AND GENDER)																					
	Gender	Arts & Humanities				Engineering, Computer & Info. Sciences				Social Sciences				Math & Sciences				Interdisciplinary Studies			
		B	D	A	DK	B	D	A	DK	B	D	A	DK	B	D	A	DK	B	D	A	DK
Set up a personal computer	M	66.7	28.6	0.0	4.8	87.0	11.7	1.3	0.0	65.7	20.0	5.7	8.6	90.5	4.8	4.8	0.0	66.7	33.3	0.0	0.0
	F	64.6	21.5	6.2	7.7	59.1	36.4	2.3	2.3	66.7	22.2	1.9	9.3	79.4	14.7	2.9	2.9	60.0	40.0	0.0	0.0
Secure a computer and personal privacy	M	42.9	28.6	14.3	14.3	68.4	25.0	6.6	0.0	45.7	37.1	5.7	11.4	66.7	23.8	4.8	4.8	66.7	33.3	0.0	0.0
	F	4.4	28.1	7.8	20.3	36.4	50.0	9.1	4.5	47.2	22.2	5.6	25.0	44.1	23.5	11.8	20.6	20.0	20.0	20.0	40.0
Develop and share documents and presentations	M	61.9	33.3	0.0	4.8	68.8	27.3	3.9	0.0	54.3	37.1	2.9	5.7	76.2	23.8	0.0	0.0	33.3	66.7	0.0	0.0
	F	59.4	31.3	4.7	4.7	59.1	40.9	0.0	0.0	53.7	38.9	2.8	4.6	58.8	35.3	2.9	2.9	40.0	40.0	0.0	20.0
Use a computer to analyze or display information	M	38.1	23.8	4.8	33.3	50.6	48.1	1.3	0.0	34.3	34.3	2.9	28.6	61.9	38.1	0.0	0.0	66.7	33.3	0.0	0.0
	F	27.7	26.2	6.2	40.0	29.5	65.9	2.3	2.3	25.0	40.7	0.9	33.3	33.3	48.5	0.0	18.2	20.0	20.0	40.0	20.0
Find and evaluate information on the Internet	M	66.7	28.6	0.0	4.8	77.9	20.8	1.3	0.0	62.9	37.1	0.0	0.0	71.4	28.6	0.0	0.0	100.0	0.0	0.0	0.0
	F	76.9	18.5	3.1	1.5	65.9	34.1	0.0	0.0	62.0	36.1	0.9	0.9	61.8	38.2	0.0	0.0	60.0	40.0	0.0	0.0
Learn online	M	57.1	38.1	0.0	4.8	57.1	35.1	5.2	2.6	38.2	50.0	2.9	8.8	66.7	28.6	0.0	4.8	33.3	66.7	0.0	0.0
	F	49.2	41.5	0.0	9.2	54.5	38.6	2.3	4.5	35.2	48.1	5.6	11.1	52.9	41.2	2.9	2.9	40.0	20.0	0.0	40.0
Understand social and ethical implications of technology	M	47.6	33.3	0.0	19.0	48.1	37.7	5.2	9.1	37.1	51.4	2.9	8.6	47.6	38.1	4.8	9.5	66.7	33.3	0.0	0.0
	F	32.8	43.8	6.3	17.2	36.4	50.0	6.8	6.8	38.5	45.2	4.8	11.5	51.5	24.2	3.0	21.2	50.0	50.0	0.0	0.0

NOTE: B= "I learned this before attending UMBC"; D= "I learned this during my time at UMBC"; A=" I learned this after leaving UMBC"; DK=" I don't understand or know how to do this"