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ABSTRACT

The question of a possible shift in Millennials' perceptions about gender and ICT resulted from a survey of gender stereotyping of ICT skills among college age Millennials in the USA. The results identify three clusters of skills: masculine (includes computer programming, database and networking); feminine (includes communication, working in teams, ethics, global and cultural awareness, and openness to new experiences) and gender neutral (includes initiative, ability to work under pressure, critical thinking and problem solving). These findings suggest a possible shift of gender stereotypes about ICT skills among Millennials. Nevertheless, the gender stereotyping of the more technical skills in the IT profession as masculine argues for continued interventions to alter these perceptions and expand the gender neutral space in order to broaden the participation of women in the IT field.

KEYWORDS

Female, Feminine, Gender, Gender and ICT, Gender Stereotypes, Hegemonic Masculinity, IT Skills, Individual Differences Theory of Gender and IT, IT Profession, Male, Masculine, Men, Millennials, Women

INTRODUCTION

The Millennial generation – those born between 1982 and 2000 -- was characterized by Howe and Strauss (1992, 2003) as a generational cohort distinct from their parents, the Baby Boomers, and their immediate predecessors, Generation X. This generation produced its first college graduates in 2004. "Generation Y," "Net Generation," "MTV Generation" and "Generation Me" are other terms applied to the Millennials. The term "Digital Natives" was coined by Prensky (2001) to characterize a generation of native speakers of the digital language of computers, video games and the Internet.[1] There is a considerable literature about the technology usage patterns of the Millennials (2008). Today's average college graduates in the USA have spent less than 5,000 hours of their lives reading, but over 10,000 hours playing video games in addition to 20,000 hours of watching TV. This tech-savvy generation has incorporated computer games, the Internet, email, instant messaging, Facebook, twitter and mobile phones as integral parts of their lives.

Given the Millenials' intense interaction with both information technology and software applications, a question arises about the impact of this technological exposure and literacy on their stereotypes about those for whom it is natural to be proficient with ICT. Specifically, we were interested in evidence of shifting gender stereotypes about ICT skills. Following a review of the literature about masculine stereotyping of ICT skills and knowledge, we present our research design, data collection and analysis, and research findings. We then consider the implications of our findings for challenging the association between dominant masculinities and ICT skills.

LITERATURE REVIEW

[1] It should be kept in mind that this is a broad generalization, that it applies primarily to developed regions and that being born in a certain time period does not automatically determine one's ICT skill level.

Until the last third of the twentieth century it was typical to classify individuals into fixed groupings by sex – male and female – and gender – masculine and feminine – and to reinforce these by the imposition of gender stereotypes (Wolffram & Winker 2004). However, the emergence of second wave feminism, sexuality studies and masculinity studies in the 1970s signaled the deconstruction of a gender binary in which sex is conflated with gender (Beasley, 2005; Halberstam, 1998). The implications for the study of gender and ICT are significant. Lie (2003) argues that "men and women are changing their practices and entering new relationships with each other and their environments, and the understanding of the concepts of masculine and feminine are just as unstable as men's and women's looks, activities and practices. One challenge is … to construct methodological approaches to study change and variation in ICT-gender relationships." In this study, we take up Lie's call and seek to discover how millennial students enrolled in IT courses at two United States' universities are (re)constructing the gender – ICT skills relationship.

The starting point for this investigation is the long history of IT occupations and technical skills being stereotyped as masculine (Cockburn, 1985; Margolis & Fisher, 2003; Wajcman, 1991). Even when females "…are ostensibly 'included', they do not seem to belong to 'real technology'. Instead, they tend to be presented as 'other' to technology or their relationship to technology is trivialized" (Henwood 1999/2000, p. 21). Wilson (1997) notes that the culture in computing has traditionally used such masculine images as competition, sports and violence, and is strengthened by a discourse that is full of phrases with masculine connotations such as "killing a job", "work-benches", "tool-kits", "drives" and "engines." Thus, although computers themselves are neutral, a strong case can be made that the culture in computing and the socially constructed discourse surrounding it, are not. Cockburn (1985) demonstrated that technology and technical skills are implicated in the construction of gender identities so that it has become widely accepted, though not empirically proven, that men are good with technology whereas women are not. The underrepresentation of women in IT has served to reinforce the dominant cultural construction of computing as masculine (Mahony & Van Toen, 1990). Superimposing masculinity on the skills of an IT professional has extended to both technical and managerial skills required of successful IT professionals.

Consistent with an orientation toward a gender binary, studies of gender and technical skills have typically searched for between-sex group differences. Cejka and Eagly (1999) surveyed 189 introductory psychology students in a study of perceptions of gender typing of occupations. They found that whereas creativity was perceived to be more feminine, cognitive skills (such as analytical, mathematical, quantitative and logical skills) were perceived to be more masculine. Ambition and competitiveness have also been perceived as more masculine. Kirlidog, et al (2009) found that, compared with males, female IT professionals perceived themselves to have more empathy, stronger curiosity oriented towards other cultures, and more positive attitudes towards co-workers' criticisms. While IT professionals generally preferred to work alone, males preferred this significantly more than females. Although both males and females reported difficulties in translating software requirements from end users to IT professionals, females tended to be able to grasp the requirements significantly more easily than males. Females also tended to be more successful than males in communicating the limits of hardware and software to end users. In all, although there were insignificant sex group differences in some other aspects such as rage control at the workplace and the capability to make friends in an unfamiliar environment, males perceived themselves to be better at and more successful in managing conflict at the workplace while females' interpersonal communication skills were perceived as superior to those of their male counterparts. Studies such as those described above do not typically theorize the *causes* of these observed differences: whether they be biologically determined or socially constructed.

Contradicting the gender stereotyping of technical skills as "hard" and masculine, and interpersonal skills as "soft" and feminine, research shows that managerial skills (which are arguably "soft" and interpersonal) are gender typed as masculine as well. Lyons, Sweitzer and Ng (2009) observe that there is a general perception that men possess more of certain attributes such as dominance, and aggression, while women are seen as exhibiting greater nurturance and sympathy. Many of the stereotypes used to describe successful managers (self-confident, dominating, competitive, decisive, aggressive and independent) are considered to be masculine. Stereotypical feminine traits and management styles (consultative, conciliatory, partnership-oriented and collaborative) are generally viewed as positive but were not used to describe successful managers. Hence, management positions, and science and engineering jobs have been considered to be "men's work" while child care, teaching, and clerical work have been seen as "women's work." It is important to note, however, that in many cultures women have been given "permission" to be more assertive in recent years, such that younger women in some studies have displayed no significant difference on measures of assertiveness compared to men (Twenge & Campbell, 2008). Others have reinforced this point that women are more ambitious and career driven than women from earlier generations (Konrad, Ritchie, Lieb, & Corrigall, 2000). At the same time, men are becoming less tolerant of work that separates them from their families (Maccoby 1995).

Hall-Taylor (1997) argues that it is important to focus on the function and effects of gender/sex differences that serve to reinforce men in senior management and technical positions. Two studies published in the *Harvard Business Review* serve as examples of how gender stereotypes have opposite impacts on men and women. Cuddy (2009) found that stereotypes

influence "survival decisions" such as whom to trust, doubt, defend, attack, or hire. Survival decisions occur when a person meets someone new. Survival decisions are made about: one's intentions (warmth) and the capability of acting on those intentions (competence). Warmth and competence are inversely related. Thus, women are often stereotyped as having positive intentions but as being less capable of accomplishing tasks.

But given Millennials' early and sustained engagement with ICT, a question arises about the application of these gender stereotypes to them. Many of the traits used to characterize Millennials relate to their relationship with technology. They are often constructed as the first generation to grow up with various technologies such as iPods, cell phones, and laptops. This is believed to contribute to their short attention spans and ability to multitask. Use of instant messaging has trained Millennials to expect fast responses (Tapscott 1998). They connect with people through social networking Web sites and instant messaging throughout the day. Employers are advised that using these social networking tools will enable them to better connect with talent in the Millennial Generation (Orrell 2007).

With respect to the gender typing of Millennials and ICT, there are signs of both change and the existence of barriers. For example, in 2008, the ACM New Image for Computing (NIC) team conducted a nationwide online survey of 1406 college-bound teens. Most college-bound males, regardless of race/ethnicity, revealed a positive view of computer science and computing as a career or possible major. These males associated computing with words like "video games," "design," "electronics," "solving problems," and "interesting." College-bound females in the study, however, were significantly less interested. For these women, computing is associated with "typing", "math", "nerd" and "boredom". When asked about the attractiveness of college majors, 74% of boys (83% of Hispanic boys and 76% of African American boys) rated computer science as a "very good" or "good" choice for them. Among the girls, however, computer science fared poorly—only 10% of the girls rated it as a "very good" choice and 22% rated it as "good" (38% of Hispanic and African American girls). Characteristics such as "working in a cutting-edge field" or "having the power to create and discover new things" are important to respondents and do not, in their opinion, appear to be incompatible with a career in computer science. On the other hand, "working with people in an interconnected, social, and innovative way" and "having the power to do good and doing work that makes a difference in other people's lives" were seen as incompatible with computing careers. College-bound African American and Hispanic teens, regardless of gender, were more likely than their white peers to be interested in computing, although for girls the overall interest remains extremely low.

Joshi and Kuhn (2007) point out that, "although both the IT field as a whole and many of its core skill sets are stereotypically viewed as masculine, there has been relatively little research on gender typing in IT" (p.401). The research need that results from this review of gender stereotypes about ICT among Millennials is for finer grained analysis of where these changes might be occurring. Thus, the research question motivating this study is: *Do Millennials have a different view of masculinity as it applies to ICT skills and knowledge?*

METHODOLOGY

The masculinization of the IT field is frequently explained using group level analysis suggesting that gender role expectations account for this phenomenon. Thus, because of the "…conflict caused by deviating from these expectations, females and males predominantly sort themselves into occupations related to their gender roles" (Joshi & Kuhn, 2005). However, a problem with this explanation is that it assumes that all females and males receive similar messages, interpret role senders' messages in the same manner, and adopt similar patterns of behavior (Trauth & Quesenberry, 2006). This is problematic insofar as gender is just one among an intersecting set of characteristics – such as age, nationality, race, ethnicity and social class -- that shape one's identity (Kvasny et al., 2009). Hence, our research team is investigating the intersectionality of these other identity characteristics with gender. In the research reported here, we are concerned with the influence of age on gender and ICT. In conducting the research reported in this paper we chose the *individual differences theory of gender and IT* (Trauth 2002, 2006; Trauth et al., 2009) as a theoretical perspective because this theory provided us with the conceptual tools to examine the intersection of age and gender in order to uncover a more nuanced explanation of the masculinization of ICT skills.

The research was designed to identify possible shifts in the imposition of masculinity on ICT skills among the Millennials. Past literature has empirically establish the gender dimensionality of general human skills (see Bem 1981; Cejka & Egly 1999). The current gender-typing literature, however, does not sufficiently establish the gender dimensionality or neutrality of ICT skills as perceived by the Millennials. We uncovered the dimensionality of the ICT skills by capturing the perceptions of the Millennials in our study using survey methodology. Undergraduate students enrolled in IT courses at two large U.S. public universities were surveyed to examine the extent to which Millennials perceive ICT related skills to be masculine in nature. Students participated in this study on a volunteer basis with the opportunity to earn bonus points. A total of 1,010

students (24% women, 75% men, and 1% transgender)[2] completed an on-line survey. On a scale of 1 (feminine) to 5 (masculine), students were asked to rate a list of 36 skills related to the IT profession, which were drawn from previous research. Huang et al. (2009) conducted an extensive review of IT job skills across three genres of texts: scholarly articles, practitioner literature, and online job ads. Our survey uses the key IT skills identified in this study. To avoid any bias due to sequencing, these 36 items were presented to each individual in a randomized fashion.

First an exploratory factor analysis (EFA) was conducted on 36 IT skills to uncover the factor structure underlying the gender typing of ICT skills. Three factors emerged from this analysis. The factor loadings and the corresponding model fit statistics are listed in Table 1. An item was said to load on a given factor if the factor loading was greater than 0.38 for that factor, and was less than 0.38 for the others. Seven of the 36 skills were removed because they loaded marginally on multiple factors which suggested that these seven items do not fit cleanly into any one of the three factors. The model fit statistics for the three factor model structure are very strong, thereby providing strong support for our three factor model. Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) are well above the cut-off of 0.90 and the Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) were well below the required cut-off of 0.06. The EFA analysis confirm that 29 IT skills are indeed capturing three constructs, each of which is distinct from one another.

We confirmed our measurement model by conducting a confirmatory factor analysis (CFA). A measurement model describes the relationship between the factors uncovered in the EFA analysis and their respective indicator variables, i.e., IT skill items. The measurement model is said to provide a good fit to the data if each of the IT skills items are doing a good job of measuring the three factors. CFA analysis allows us to test the fit of our measurement model. The CFA results are list in Table 2. The model fit for the measurement model is strong with the CFI, TLI, RMSEA, and SRMR well within the acceptable range. The loading ranged from 0.35 to 0.67, which explains variance ranging from 12% to 45 %. The CFA analysis provides strong support for our measurement model, which suggests that the IT skill items under each of the three factors are adequately measuring the three constructs.

RESULTS

Of the three categories of skills that emerged from this analysis, one category was identified as masculine by the students (with the factor mean of 3.33), one category was gender typed as feminine (with the factor mean of 2.75), and a third category identified by the students we label "gender neutral" (with the factor mean of 3.17). Our analysis shows that of the 29 skills, nine of them reflect feminine skills, eight of them measure gender neutral skills, and the remaining twelve reflect masculine skills. The means corresponding to each of the 29 skills are displayed in Figure 1. The masculine skills are the most technical in nature: integrating enterprise applications, process analysis, system implementation, system auditing and information assurance, programming, business analytics, database management, networking, web development, IT security, IT architecture/infrastructure, and ability to understand technological trends. The skills that were stereotyped as feminine include: communication, ability to work in teams, creativity, customer relationship management, ethics, global and cultural awareness, openness to new experiences, sensitivity to organizational culture and politics, and maintaining workplace relationships. These two sets of skills are consistent with the literature on gender typing of ICT skills. But the finding of particular interest in this study, and that speaks directly to the research question, is the emergence of a third category of skills that the Millennials seemed to be labeling as androgynous in nature, insofar as they are situated between the masculine and the feminine skills. This set of skills includes: leadership, initiative, dependability, ability to work under pressure, critical thinking, problem solving, business knowledge, and project management.

[2] That the subjects fall into three gender categories, not two (i.e. masculine, feminine and transgender) reinforces the claim about the deconstruction of a gender binary that was made earlier.

IT Skills	Feminine	Gender Neutral	Masculine
Communication skills (e.g., verbal, written, presentation skills)	0.565	0.024	-0.117
Ability to work in teams	0.423	0.071	0.064
Customer relationship skills	0.752	-0.228	-0.009
Workplace relationship skills	0.584	0.013	-0.091
Openness to new experiences	0.423	0.049	0.065
Creativity	0.553	-0.077	-0.018
Sensitivity to organizational culture and politics	0.597	-0.095	-0.058
Ethics	0.540	0.024	0.028
Global and cultural awareness	0.532	-0.127	0.016
Leadership skills	-.322	0.713	-0.015
Initiative	0.068	0.448	-0.095
Dependability	0.187	0.377	-0.081
Ability to work under pressure	-.240	0.594	0.028
Critical thinking	0.072	0.398	0.137
Problem solving skills	0.016	0.364	0.138
Business knowledge (knowledge about business functions)	0.004	0.402	0.202
Project management skills (e.g., project budgeting; project planning; project risk management)	-.048	0.407	0.138
Integrating enterprise applications	0.099	0.025	0.496
Process analysis (e.g., gathering systems requirements; systems analysis)	0.099	-0.029	0.565
System implementation skills	-.003	-0.020	0.567
System auditing and information assurance	0.208	0.037	0.402
Programming skills (e.g., C#, XML, VB, Java)	-.162	0.064	0.592
Business analytics skills (e.g., data mining, online analytics processing systems)	0.056	0.087	0.454
Database management skills (e.g., manage SQL server, ORACLE DB)	-.008	-0.028	0.627
Networking skills (e.g., LAN/WAN; setting up networks; wireless networks)	-.086	0.010	0.613
Web development skills	0.019	-0.062	0.579
IT security	-.096	-0.023	0.585
IT architecture/infrastructure	-.027	-0.058	0.690
Ability to understand technological trends	-.055	0.154	0.438
Model Fit			
CFI	0.96		
TLI	0.97		
RMSEA	0.02		
SRMR	0.03		

Table 1. Exploratory Factor Analysis Results

Measurement Model	Range of Standardized Factor Loadings	CFI	TLI	SRMR	RMSEA
Gender Typed Skills (Feminine ; Masculine, Gender Neutral)	.35-.67	.91	.90	0.060	0.026

Table 2: Confirmatory Factor Analysis Results

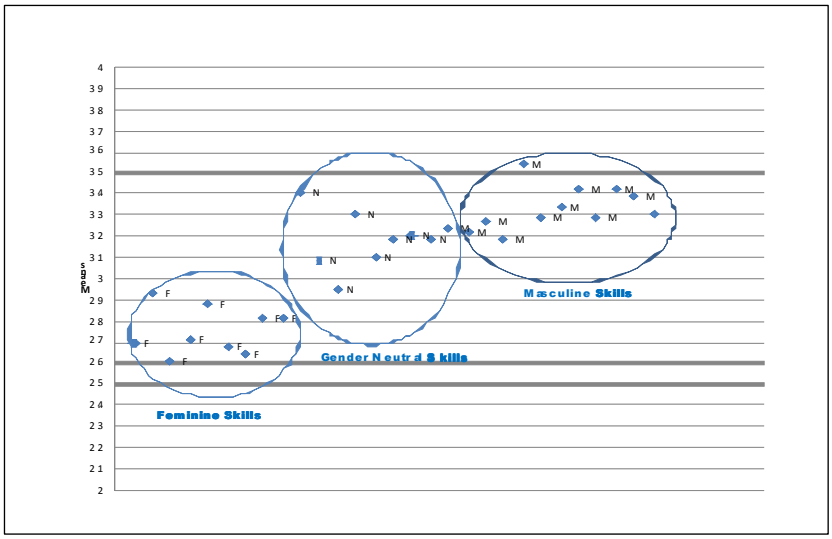

Figure 1. Means Corresponding to the Three Gendered IT Skill Categories

DISCUSSION

Two questions are raised by these findings. First, does the emergence of a set of gender neutral ICT skills among these college age students signal a possible shift in perceptions among Millennials about ICT and masculinity? For example, Shaw and Giacquinta (2000) found that gender had no effect on differences among students with respect to uses of computers in academics. And according to Lowen (2010), Millennial women do not believe that gender determines male and female roles. Second, do these findings suggest that hegemonic masculinity, the culturally normative ideal of masculinity, is loosening its grip on the IT field? The concept of hegemonic masculinity, which originated in the early 1980s, has had a significant impact on thinking about gender, sexuality and power derived from a patriarchal gender system (Connell and Messerschmidt, 2005). Key to the concept of hegemonic masculinity is "the winning and holding of power and the formation (and destruction) of social groups in that process (Donaldson, 1993, p. 644)". Hegemonic masculinity entered social science discourse across several disciplines including the social study of technology. In this work, science and technology (including information technology) is portrayed as being socially, historically and culturally shaped by hegemonic masculinity (Faulkner, 2000; Lohan, 2000; Seilder, 1989). The effect has been that "the feminine" has been precluded from the science and technology domain (Murray, 1993) as demonstrated in a variety of empirical studies (Cockburn and Ormrod, 1993; Martin, 1991; Oudshoorn, 1994; Suchman, 2008). Nevertheless, Wajcman (2010) argues that while the imposition of hegemonic masculinity on the engineering profession is deeply rooted, it is not unalterable. The focus of the limited writing about hegemonic masculinity and IT, to date, is on masculinity and sexuality (e.g. Kreps, 2009; Light, 2007). Hence, these findings broaden the discourse about hegemonic masculinity and IT to include discussion of masculinity and ICT skills. Future research will be conducted to verify the emergence of these three clusters in other contexts. In addition, qualitative data will be collected in order to better understand the reasoning behind the clusters. Additional questions remain. If, indeed, there is a shift in perception among Millennials away from associating ICT with hegemonic masculinity, what will happen when these young people enter the ICT workforce? Will their views of gender and ICT motivate organizational change or will the

existing, hegemonic masculine culture continue to dominate the IT workplace? Future research that follows these Millennials into the workplace is needed.

CONCLUSION

This survey of gender stereotyping of ICT skills among college age Millennials in the USA has resulted in the identification of three clusters of ICT skills. These findings are noteworthy because they raise the possibility of changing perceptions of gender stereotyped work in the IT profession. Many of the skills that were traditionally viewed as masculine (e.g., leadership skills, problem solving) (Joshi & Kuhn, 2007) are viewed as gender neutral by the Millennials in this study. Rather than rigid categories of masculine and feminine skills (leading to rigid categories of men's and women's work), these results might be revealing the emergence of a more gender neutral IT work space. These findings suggest some interesting implications for gender and ICT. On the one hand, they suggest that the tight grip that masculinity has held on the IT field might be loosening as ICT becomes increasingly ubiquitous and embedded in the everyday life of both males and females. It might also suggest that the dominant definition of masculinity -- hegemonic masculinity – might be giving way to other conceptions of masculinity that include more of the "soft" (business and interpersonal) skills that are also included in the toolkit of modern IT professionals. Nevertheless, the gender stereotyping of the more technical skills in the IT profession as masculine shows the need for continued interventions to influence these perceptions and expand the gender neutral space in order to broaden the participation of women in the IT field.

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REFERENCES

1. Beasley, C. (2005). Gender & sexuality, Sage, London.
2. Bem, S. (1981). Bem sex-role inventory, Consulting Psychologists Press, Redwood City, CA.
3. Benyo, J. and White, J. (2009). New image for Computing: Report on Market Research", WGBH Educational Foundation and the Association for Computing Machinery. Available at www.zephoria.org/files/NICReport.pdf; last accessed February 5, 2010.
4. Cejka, M. A.,and Eagly, A. H. (1999). Gender-stereotypic images of occupations correspond to the sex segregation of employment, *Personality and Social Psychology Bulletin,* 25, 4, 413.
5. Clarke, V. A., and Teague, G. J. (1994a). Encouraging girls to study computer science: Should we even try, *Australian Educational Computing,* 9, 1, 17-22.
6. Clarke, V. A., and Teague, G. J. (1994b). A psychological perspective on gender differences in computing participation, *ACM SIGCSE Bulletin,* 26, 1, 258-262.
7. Cockburn, C. (1985). Machinery of dominance: Women, men, and technical know-how, Pluto Press, London.
8. Cockburn, C. and Omrod, S. (1993). Gender and technology in the making, Sage Press, London.
9. Connell, R.W. and Messerschmidt, J.W. (2005). Hegemonic masculinity: Rethinking the concept, *Gender & Society,* 19, 6, 829-859.
10. Cuddy, A. (2009). Just because I'm nice, don't assume I'm dumb, *Harvard Business Review*, February, p. 24. Available online at http://hbr.org/web/2009/hbr-list/because-i-am-nice-dont-assume-i-am-dumb; last accessed February 5, 2010.
11. Donaldson, M. (1993). What is hegemonic masculinity? *Theory and Society,* 22, 643-657.
12. Eagly, A. H., and Wood, W. (1991). Explaining sex differences in social behavior: A meta-analytic perspective, *Personality and Social Psychology Bulletin,* 17, 3, 306.
13. Faulkner, W. (2000). The power and the pleasure? A research agenda for "making gender stick" to engineers. *Science, Technology & Human Values,* 25, 1, 88-120.
14. Halberstam, J. (1998). Female masculinity, Duke University Press, Durham, NC.
15. Hall-Taylor, B. (1997). The construction of women's management skills and the marginalization of women in senior management, *Women in Management Review*, 12, 7, 225-263.
16. Hankin, H. (2005). The new workforce: Five sweeping trends that will shape your company's future, AMACOM, New York.
17. Henwood, F. (1999/2000). Exceptional women? Gender and technology in UK higher dducation. *IEEE Technology and Society Magazine,* 18, 21-27.
18. Howe, N. and Strauss, W. (2003). Millennials go to college, LifeCourse, New York.

19. Huang, H., Kvasny, L., Joshi, K.D., Trauth, E.M. and Mahar, J. (2009). Synthesizing IT job skills identified in academic studies, practitioner publications and job ads, *Proceedings of the ACM SIGMIS Computer Personnel Research Conference,* May, Limerick, Ireland.
20. Joshi, K. D. and Kuhn, K. (2005). Examining the masculinity and femininity of critical attributes necessary to succeed in IT, *Proceedings of the 2005 ACM SIGMIS Computer Personnel Research Conference,* April, Atlanta, GA.
21. Joshi, K. D., and Kuhn, K. M. (2007). What it takes to succeed in information technology consulting, *Information Technology & People,* 20, 4, 400-424.
22. Kirlidog, M., Aykol, M., and Gulsecen, S. (2009). Interpersonal communication and gender in the ICT profession. *IEEE Technology and Society Magazine,* Spring, 48-56.
23. Koberg, C.S., and Chusmir, L.H. (1991). Sex role conflict in sex-atypical jobs: A study of female-male differences, *Journal of Organizational Behavior,* 12, 5, 461-465.
24. Konrad, A.M., Ritchie, J.E., Lieb, P. and Corrigall, E. (2000). Sex differences and similarities in job attribute preferences: A meta-analysis, *Psychological Bulletin*, 126, 593-641.
25. Kreps, D. (2009). Performing the discourse of sexuality online. Americas Conference on Information Systems, San Francisco, CA. [http://aisle.aisnet.org/amcis2009/517]
26. Kvasny, L., Trauth, E.M. and Morgan, A. (2009). Power relations in IT education and work: The intersectionality of gender, race and class, *Journal of Information, Communication and Ethics in Society,* 7, 2/3, 96-118.
27. Lie, M. (2003). Gender and ICT – New connections, in M. Lie, (Ed.) *He, She and IT Revisited*. Gyldendal Akademisk, Oslo, 9-33.
28. Light, B. (2007). Introducing masculinity studies in information systems research: The case of Gaydar, *European Journal of Information Systems*, 16, 658-665.
29. Lohan, M. (2000). Constructive tensions in feminist technology studies, *Social Studies of Science,* 30, 6, 895-916.
30. Lowen, L. (2010). Millennials - How Millennials are creating a cultural shift in gender roles. Available at http://womensissues.about.com/od/intheworkplace/a/MillennialsGenderRoles.htm; last accessed February 5, 2010.
31. Lyons, S., Sweitzer, L. and Ng, E. (2009). The shifting nature of careers in Canada: A framework for research, ASAC, Niagra Falls, Ontario.
32. Maccoby, M. (1995*).* Why work? Motivating the new workforce, Miles River Press, Alexandria, VA.
33. Mahoney, K. and Van Toen, B. (1990). Mathematical formalism as a means of occupational closure in computing--Why "hard" computing tends to exclude women, *Gender and Education*, 2, 319-331.
34. Margolis, J. and A. Fischer (2003). Unlocking the clubhouse: Women in computing, The MIT Press, Cambridge.
35. Martin, M. (1991). Hello central? Gender, technology, and culture in the formation of telephone systems, McGill-Queen's University Press, Montreal.
36. Martin, C. (2005). From high maintenance to high productivity: What managers need to know about generation Y, *Industrial and Commercial Training*, 37, 1, 39-44.
37. Microsoft (2008). Insurity/Microsoft 'Millennials in insurance survey 2008. Available at http://download.microsoft.com/download/3/a/8/3a8f5085-f52b-4d3f-b47b-5c70541ff2ca/MillennialsInsuranceSurvey.ppt; last accessed February 20, 2010.
38. Murray, F. (1993). A separate reality: Science, technology and masculinity, in E.Green, J. Owen and D. Pain (Eds.), *Gender by Design? Information Technology and Office Systems*. Taylor and Francis, Bristol, PA..
39. Orrell, L. (2007). Millennials incorporated, Intelligent Women Publishing, Deadwood, OR.
40. Oudshoorn, N. (1994). Beyond the natural body: An archaeology of sex hormones, Virago, London.
41. Prensky, M. (2001). Digital natives, digital immigrants, *On the Horizon,* 9, 1-6.
42. Seidler, V.J. (1989). Rediscovering masculinity: Reason, language and sexuality, Picador, London.
43. Shapka, J. D., & Ferrari, M. (2003). Computer-related attitudes and actions of teacher candidates. *Computers in Human Behavior,* 19, 3, 319-334.
44. Shashaani, L., & Khalili, A. (2001). Gender and computers: Similarities and differences in Iranian college students' attitudes toward computers. *Computers and Education,* 37, 3/4, 363-375.
45. Shaw, F. S., and Giacquinta, J. B. (2000). A survey of graduate students as end users of computer technology: New roles for faculty, *Information Technology Learning and Performance Journal,* 18, 21-40.
46. Strauss, W. and Howe, N. (1992). Generations: The history of America's future, 1584 to 2069, Harper Perennial, New York.
47. Suchman, L. (2008). Feminist STS and the sciences of the artificial, in E. Hackett, O. Amsterdamska, M. Lynch and J. Wajcman (Eds.), *The Handbook of Science and Technology Studies*, 3rd Edition. MIT Press, Cambridge.
48. Tapscott, D. (1998). Growing up digital: The rise of the net generation, McGraw-Hill, New York.
49. Trauth, E.M. (2002). Odd girl out: An individual differences perspective on women in the IT profession, *Information Technology & People,* 15, 2, 98-118.

50. Trauth, E.M. (2006). "Theorizing gender and information technology research," in E.M. Trauth (Ed.), *Encyclopedia of Gender and Information Technology.* Idea Group Publishing, Hershey, PA, 1154-1159.
51. Trauth, E.M. and Quesenberry, J. (2006). Are women an underserved community in the information technology profession? *Proceedings of the International Conference on Information Systems,* December, Milwaukee, WI.
52. Trauth, E.M., Quesenberry, J.L. and Huang, H. (2009). Retaining women in the U.S. IT workforce: Theorizing the influence of organizational factors, *European Journal of Information Systems*, 18, 476-497.
53. Twenge, J.M., and Campbell, S.M. (2008). Generational differences in psychological traits and their impact on the workplace, *Journal of Managerial Psychology,* 23, 8, 862-877.
54. Varank, I. (2007). Effectiveness of quantitative skills, qualitative skills, and gender in determining computer skills and attitudes: A causal analysis, *The Clearing House,* 81, 2, 71-80.
55. Volman, M., van Eck, E., Heemskerk, I., and Kuiper, E. (2005). New technologies, new differences. Gender and ethnic differences in pupils' use of ICT in primary and secondary education, *Computers & Education,* 45, 35-55.
56. Wajcman, J. (1991). Feminism confronts technology, The Pennsylvania State University Press, University Park, PA.
57. Wajcman, J. (2009). Feminist Theories of Technology. *Cambridge Journal of Economics, 34*(1), 143-152.
58. Wilson, E. (1997). Computing, computer science and computer scientists: How they are perceived. In R. Lander & A. Adam (Eds.), *Social Europe: Occupational segregation of women and men in the European community supplement*.
59. Winn, J. and Heeter, C. (2009). Gaming, gender, and time: Who makes time to play? *Sex Roles,* 61, 1-13.
60. Wolffram, A. and Winker, G. (2004). Challenging gender stereotypes in engineering education, *International Symposium IGIP/IEEE/ASEE*, September 27-30, Fribourg, Switzerland.
61. Zemke, R., Raines, C., and Filipczak, B. (2000). Generations at work: Managing the clash of veterans, boomers, Xers, and nexters in your workplace, AMACOM, New York.