The Influence of Self-Efficacy, Gender Stereotypes and the Importance of IT Skills on College Students' Intentions to Pursue IT Careers

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ABSTRACT

Diversity-related themes such as social inclusion, community informatics, and broadening participation in undergraduate and graduate education are consistently discussed at the i-Conference. In this paper, the authors examine three factors (self-efficacy, gender stereotypes about IT skills, and the importance of IT skills) which are critical in shaping career choices of the iSchool undergraduate population. To further our understanding of human diversity, we seek to determine if there is variation in these three factors by race/ethnicity. The findings suggest that students across racial and ethnic backgrounds are similar in their beliefs about job skills required for IT careers as well as their ability to acquire and perform these skills. However, students seem to be more confident in their non-technical skills and place highest importance on human skills. Information science undergraduate programs may, therefore, need to place greater emphasis on the transfer of technical skills and educate students about the importance of these skills in the workplace.

Categories and Subject Descriptors

K.3.2 Computer and Information Science Education

General Terms

Human Factors

Keywords

K self-efficacy, IT skills, race, ethnicity, career choice

1. INTRODUCTION

Diversity continues to garner broad and varied attention from scholars in the iSchool community. Chu [1] notes that diversity research has an interest in uncovering inequities in information access and use by the Other. The Other is defined as "groups that are subordinated or excluded from dominant society or culture(s), and have been organized into particular categories of race, ethnicity, gender, sexuality, class and development, among others."

At prior iConferences, for instance, international development and ICT is a recurring diversity-related theme. Srinivasan and colleagues [2] hosted a panel that explored the relationship between Information Technologies and International Development. Ho and Veerararaghavan [3] hosted a roundtable discussion for doctoral students pursuing research on ICT in emerging regions. Using the case study approach, Potnis and Demissie [4] explored barriers to socio-economic opportunities in Africa and how these barriers impede the success of eGovernment initiatives. Global studies such as these are critically important for understanding the 70% of the world that still lacks access to digital technologies.

Community informatics is a second diversity-related theme at the iConferences. In poster presentations, Igwe [5] applied Oldenburg's Third Places framework to the study of an online community that utilized blog sites to discuss the crisis of HIV/AIDS within the African American community. Others have reported on case studies of community computing projects such as the Washington State Communities Connect Network [6]. Willliams [7] and Trauth [8] led panels that discussed research projects to raise computer and information literacy skills in historically underserved communities. Wolske and colleagues [9] discussed the design of compelling experiences that attract audiences to community technology centers. Chu and Williams [10] theorized social inclusion and engagement as useful ways of reframing community informatics research, while Ginger, Kehoe and Khanal [11] interrogated methodological considerations.

A third theme is the diversification of iSchool faculties and student bodies. According to a roundtable discussion hosted by Currier, Atwood and Trauth [12] many iSchools are experiencing difficulties in identifying and recruiting Master's and PhD students and faculty members from under-represented groups. They then described an initiative led by the University of Pittsburgh School of Information Sciences (SIS), in cooperation with other academic institutions throughout the Commonwealth of Pennsylvania, to develop a Summer Institute on Graduate Study in the Information Sciences (SIGSIS) for promising undergraduate

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juniors and seniors who demonstrate strong potential to earn doctoral degrees and become members of iSchool faculties.

Undergraduate education has a significant effect on our collective future because these programs shape first impressions of many current and prospective students [13]. Choi [14] reports that many college students perceived that IT is something that they would have to confront in their future, but existing computer science programs did not satisfy their needs. This finding suggests that related programs such as information systems and information sciences may play an important role in attracting, retaining and placing students in IT-related careers.

The objective of this study is to examine three factors (self-efficacy, gender stereotypes about IT skills, and the importance of IT skills) by ethnicity, which are critical in shaping career choices of the undergraduate population. Prior research (e.g. [15]) has demonstrated usefulness of considering the intersectionality of gender, ethnicity and class when examining the issue of under represented groups in the information fields. Hence, to further our understanding of human diversity, we seek to determine if there is variation in these three factors by race/ethnicity.

2. LITERATURE REVIEW

2.1 IT Skills Self Efficacy

Self-efficacy is the belief individuals have about their capability to perform an action or task to achieve a goal [16]. Efficacy requires both the knowledge to perform behaviors and the belief that the behaviors will have the desired effect [16]. Levels of self-efficacy are determined by factors such as previous experience (success and failure), vicarious experience (observing others' successes and failures), verbal persuasion (from peers, colleagues, relatives) and affective state (emotional arousal, e.g. anxiety) [16]. Racial and ethnic identities are implicated in all of these factors, developing out of previous success and failures and then shaping future experiences [17].

These successes and failure also are influential in shaping beliefs toward IT careers. In the area of STEM education, researchers have found that self-efficacy positively predicts interest in careers, choice of major, persistence in major, and pursuit of careers [18][19][20]. Joshi et al. [21] report two interesting findings on the relationship between self-efficacy and career choice. On the one hand, college students who place low importance on technical skills and have low technical self-efficacy are attracted to IT careers. It seems that these students believe that they can acquire requisite technical skills through their coursework. On the other hand, college students who have high confidence in their non-technical self-efficacy are less likely to choose IT as a career. It seems that these students do not perceive that interpersonal and business skills such as leadership and customer relationships skills are critical to succeed in IT careers.

However, racial and ethnic stereotype threat may negatively impact self-efficacy in students from under represented groups, restricting their practice in IT use and the intention to pursue IT careers. Stereotype threat is the salience of negative stereotypes about one's identity group in a performance domain (e.g., academic tests, mathematics, computer use). Prior research suggests that stereotype threat among racial and ethnic groups may hinder beliefs in one's ability to carry out tasks and engage in activities [22][23]. These threats emerge from both distorted group images and/or lack of representation of one's racial or ethnic group. Jackson et al. [24] found that simply priming ethnic and racial identities through a stereotypic association between racial groups and the ability to use technology effectively can evoke self-doubt.

Research has also noted the importance of ethnicity in determining the effectiveness of mediated information for users. Judgments of the relevance and utility of web-based information are related to the degree to which the user's ethnicity is communicated through qualities such as graphics and text [25]. Identity-relevant information also fosters confidence in utilizing information [26]. For instance, the Cultural Access Group [27] found that 52% of African American respondents said people of color have unique web-based needs, compared to only 16% of the general market. Moreover, only 33% of African Americans said content on the web is adequate for them. It appears, then, that having access to racial and ethnic identity-relevant information has important implications for users' confidence in being able to seek, find, and interact with web-based information.

2.2 Gender Stereotyping of IT Skills

Feminist research consistently finds that IT occupations and technical skills are stereotyped as masculine [28][29][30]. Cockburn [28] has shown how technology and technical skills are implicated in the very construction of gender identities so that it has become widely accepted, though not empirically proven, that men are good with technology whereas women are technically incompetent. Despite the gender stereotyping of technical skills as 'hard' and masculine and interpersonal skills as 'soft' and feminine, the research shows that managerial skills (which are arguably 'soft' and interpersonal) are gender typed as masculine as well [31][32].

However, Trauth et al. [33] argue that there appears to be, at present, signals suggesting a shift in undergraduates' view of masculinity as it applies to IT. In an online survey, undergraduate students were asked to rate a list of 36 IT skills on a scale from 1 (feminine) to 5 (masculine). The results of the confirmatory factor analysis indicate that nine of IT skills reflect feminine skills, eight measure gender neutral skills, and the remaining twelve reflect masculine skills. The masculine skills (e.g. integrating enterprise applications, process analysis, system implementation skills, system auditing and information assurance, programming skills, business analytics skills, database management skills, networking skills, web development skills, IT security, IT architecture/infrastructure, and ability to understand technological trends) are the most technical in nature. The skills that were stereotyped as feminine (e.g. communication skills, ability to work in teams, creativity, customer relationship skills, ethics, global and cultural awareness, openness to new experiences, sensitivity to organizational culture and politics, and workplace relationship skills) are more interpersonal in nature. These two sets of skills arise fairly typically in the literature about the gender typing of ICT skills. The more interesting finding is the emergence of a third category of skills (e.g. leadership skills, initiative, dependability, ability to work under pressure, critical thinking, problem solving skills, business knowledge, and project management skills) that the survey respondents seemed to be labeling as androgynous in nature, insofar as they are situated between the masculine and the feminine skills.

The research on gender stereotyping of IT skills, however, provides little guidance on if and how these gender stereotypes

differ by racial and ethnic groups and how these differences impact career choice. We obtain some insights from a nationwide online survey of 1406 college-bound teens conducted by the ACM New Image for Computing team [34]. Most college-bound males, regardless of race/ethnicity, revealed a positive view of 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 appear to be compatible with IT careers. However, "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 IT careers. One unexpected finding was that 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.

2.3 Importance of IT Skills

The factor that we examine is how important is it that someone working in an IT career would need specific technical, business management and organizational, and interpersonal skills to be successful. Universities periodically update their curriculum based on the recommendations made by the IT practitioners, recruiters, and educators. This process of consulting with the stakeholders to solicit feedback regarding the importance of skills and the quality of training that the university provides ensures that education meets the needs of industry. In the information systems field, for instance, several studies have examined anticipated trends in required job skills as reported by IT practitioners, consultants, users and educators [35][36][37]. These studies consistently report that employers are seeking an ever-increasing number and variety of business interpersonal and technical skill sets from prospective employees. Scholars have also investigated shifts in IT skill demand and job types through content analysis of job advertisements [35][38]. These studies also observe the desire to hire well-rounded employees with business knowledge, interpersonal skills and technical skills.

Students' perceptions about the importance of IT technical and non-technical skills also have a bearing on their career choices [39]. Students gain their awareness of the importance of IT job skills from referent others including the academics who teach them, peers who socialize with them, and parents who guide them. They also gain awareness by reading newspapers and trade publications that report on the promising employment prospects for IT graduates. However, limited research that has been conducted shows mixed results. For instance, Medlin [40] surveyed undergraduate students in upper level IT courses to determine the students' perceptions of required skills to be successful in IT professions. Their findings suggest that students recognize that, in addition to the technical excellence, professional skills play a key role in their success. Whereas, Martz and Cata [41] who survey both IT professionals and students, found that when compared to IT professionals, students generally undervalue the nontechnical skills and overvalue the technical skills.

2.4 Career Intentions

Career intention represents the objective to purposefully pursue an IT career as well as the interest in pursuing an IT career. This includes students' intent to take IT-related courses, commitment to the IT profession, as well as interest and choice goals [42]. Scholars have generally found that race and ethnicity contribute little to differences in career aspirations or decision-making attitudes [43] [44][45]. However, racial and ethnic minorities face additional challenges when making career choices. These students perceive fewer career opportunities and greater career barriers than do White individuals [46][47]. In addition, developing a sense of ethnic identity constitutes an additional task that African American and Hispanic students must contend with as they construct their occupational identity [48].

3. METHODOLOGY

Undergraduate students enrolled in IT courses at 2 large U.S. public universities were surveyed to examine the extent to which undergraduate students perceive IT related skills to be gendered, the importance of these skills, and their perceived level of self-efficacy in applying each skill. Students participated in this study on a volunteer basis with the opportunity to earn bonus points. A total of 1027 students (112 Asian, 32 Black, 35 Hispanic, 701 White, 27 Mixed, 27 Other, and 93 no ethnicity provided) completed an on-line survey. In this study we have only analyze the following four racial groups – Asian, Black, Hispanic, and White. Students were asked to rate a list of 36 skills related to the IT profession which were compiled through an extensive review of IT job skills across three genres of texts: scholarly articles, practitioner literature, and online job ads [49]. Students rated this list of skills in three ways: (1) gender stereotyping on a scale of 1 (feminine) to 5 (masculine); (2) perceived level of importance using a scale of 1 (not at all important) to 5 (very important), and (3) level of self efficacy using a scale of 1 (not at all confident) to 5 (very confident).

Factors underlying each of three constructs were uncovered using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA procedures were conducted by using a 'rotation' algorithm for testing which items load onto, or relate to which factors the strongest. This method of analysis uncovers the latent factor structure of a construct. The final decision regarding the factors and the items within each factor was decided based on both statistical and theoretical support. CFA procedures are useful for testing the factor structure that is revealed be the strongest within EFA context. Two IT Self-efficacy factors (Non-Technical Skills and Technical Skills), three IT Skills Importance factors (Business, Human, and Technical), and three gender typed factors (Feminine, Gender Neutral, Masculine) were revealed.

4. FINDINGS

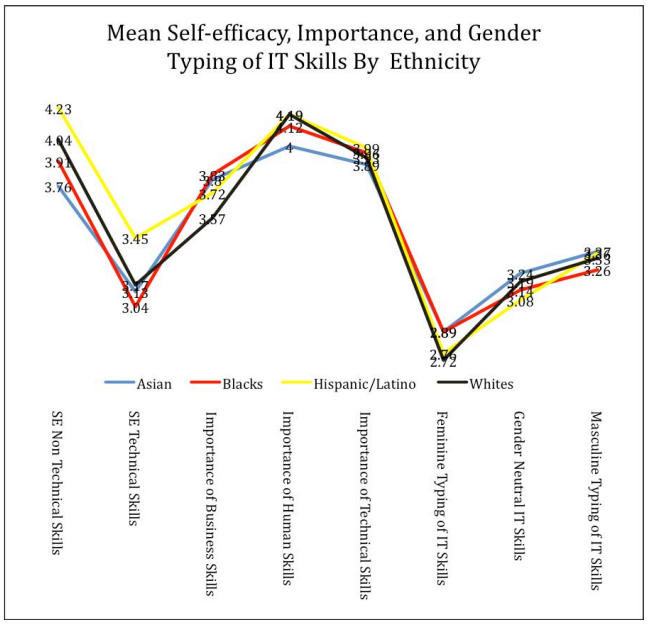
Figure 1 charts the means for self-efficacy, importance, and gender typing of IT skills by race/ethnicity. The most striking result is that for nearly all of the variables the ethnic groups are more similar than different. Thus, the findings in this study are fairly consistent with prior literature – race and ethnicity contribute little to differences in career aspirations or attitudes about skills required for IT careers. Although there does not seem

to be much variation in means among ethnicity for each of the seven variables, we observe some interesting differences and commonalities among ethnicities.

Overall, students report higher levels of self-efficacy in their IT Non-Technical skills than their Technical skills. Hispanics/Latinos have the highest level of self-efficacy for both IT Non-Technical (4.23) and IT Technical skills (3.45). Asians have the lowest level of self-efficacy for IT Non-Technical skills (3.76), while Blacks have the lowest level of self-efficacy for IT Technical skills (3.04).

With regard to IT skills importance, Human skills are rated the highest by all respondents. Racial and ethnic groups have the highest degree of agreement corresponding to the importance of Technical skills and least amount of agreement with regards to the importance of Business skills. In fact, the means difference in Business skills is the only variable in our study that exhibited a statistically significant difference among groups. Whites provided the lowest rating for Business skills (3.57), while Blacks provided the highest rating for Business skills (3.83). It seems the students do not perceive that Business skill such as such as leadership, problem solving, business knowledge, and project management are critical to succeed in IT careers. Perhaps individuals who believe they are good at Business skills may be attracted to other majors such as other marketing, communications, and management that often highlight the importance of these skills. These findings on importance of skills and self-efficacy highlight an area of opportunity for developing interventions and strategies that can help to attract and retain students who have strong Non-Technical skills.

Gender stereotyping of IT skills was measured in this survey on a scale of 1 (feminine) to 5 (masculine). Students across racial/ethnic groups rated the IT job skills fairly consistently. CFA analysis of the gender typing of IT skills results in 3 factors (feminine, gender neutral, masculine) rather than a masculine-feminine binary. This is consistent with our prior analysis [33]. We posit that the emergence of a set of gender neutral IT skills among college students signals a possible shift in perceptions among Millennials about the masculinization of IT. The tight grip that masculinity has held on the IT field might be loosening as IT becomes increasingly ubiquitous and embedded in the everyday life of both males and females. It might also suggest that the dominant notions of 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 as masculine shows the need for expanding the gender neutral space in order to broaden participation in the IT field.



5. DISCUSSION

We believe this research has important implications for diversity in the iSchool community. An important finding thus far is that students across racial and ethnic backgrounds are similar in their beliefs about job skills required for IT careers as well as their ability to acquire and perform these skills. This study also highlights the potentially important role of IT Non-Technical Self-Efficacy and the Importance of Human skills in shaping undergraduate students attraction to IT majors and careers.

The results reported here represent analysis of the first data set in this study. Additional surveys and focus groups are currently being conducted at Historically Black Colleges and Universities and Hispanic Serving Institutions so as to enable finer grained analysis of these factors by race/ethnicity. Such analysis will enable us to examine why the under representation of Blacks and Hispanics in IT persists if these students possess viewpoints that are similar to those of White and Asian students. A larger sample size will also allow us to examine the moderating effects of additional factors such as gender, majority/minority serving institution, and major on IT career selection.

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7. REFERENCES

[1] Chu, C.M. (2008). "Intersectionality and Interdisciplinarity: Information Studies and Studies of the 'Other'", Poster presented at i-Conference 2008, University of California, Los Angeles, CA, February 28-March 1.

[2] Srinivasan, R., Jackson, S., Parikh, T., & Wallack, J. (2008). "Bridging Discourses: Exploring the Relationship between Information Technologies and International Development", Panel presentation at the i-Conference 2008, University of California, Los Angeles, CA, February 28-March 1.

[3] Ho, M. & Veeraraghavan, R. (2008). “Bridging the Divide Between Theory and Practice in ICT for Development”, Roundtable at the i-Conference 2008, University of California, Los Angeles, CA, February 28-March 1.

[4] Potnis, D.D. & Demissie, D.H. (2009). “Barriers to Socio-economic Opportunities in Africa: An e-Government Perspective”, Paper presented at i-Conference 2009, University of North Carolina-Chapel Hill, NC, February 8-11.

[5] Igwe, F. (2008). “Beyond the Digital Divide into Computer-Mediated Communications: A Content Analysis of the Role of Community Weblogs in Building Oldenburg's Virtual Third Places in Black America”, Poster presentation at the i-Conference 2008, University of California, Los Angeles, CA, February 28-March 1.

[6] Crandall, M.D., Fisher, K. & Landry, C. (2009). “Communities Connect Network: Advancing e-Inclusion in Washington State through Community Tech”, Paper presented at i-Conference 2009, University of North Carolina-Chapel Hill, NC, February 8-11.

[7] Williams, K., Durrance, J. & Rosenbaum, H. (2008). “Community Informatics”, Panel presentation at the i-Conference 2008, University of California, Los Angeles, CA, February 28-March 1.

[8] Trauth, E., Bishop, A., Srinivasan, R. & Kvasny, L. (2006). "Human Diversity and Social Inclusion in the I-world", Panel presentation at i-Conference 2006, University of Michigan, Ann Arbor, MI, October 15-17.

[9] Wolske, M., Williams, Noelle S., Noble, S., Johnson, E.O. & Duple, R.Y. (2010). “Effective ICT use for Social Inclusion”, Panel presentation at the i-Conference 2010, University of Illinois at Urbana-Champaign, IL, February 3-6.

[10] Chu, C.M. & Williams, K. (2009). “Engaging Community: Methods and Values in Community Informatics”, Paper presented at i-Conference 2009, University of North Carolina-Chapel Hill, NC, February 8-11.

[11] Ginger, J., Kehoe, A. & Khanal, N. (2010). “Exploring Methods in Community Informatics”, Paper presentation at the i-Conference 2010, University of Illinois at Urbana-Champaign, IL, February 3-6.

[12] Currier, J.K., Atwood, M., & Trauth, E. (2009) “Diversity”, Panel presentation at i-Conference 2009, University of North Carolina-Chapel Hill, NC, February 8-11.

[13] Hansen, D.L., Bonzi, S.M., Kendall, L., & McDonald, D.E. (2008). “iSchools and Undergraduate Education”, Panel presentation at the i-Conference 2008, University of California, Los Angeles, CA, February 28-March 1.

[14] Choi, H. (2008). “Just Me in a Closet with a Computer”: Student Perceptions of Undergraduate Information Technology Programs”, i-Conference 2008, University of California, Los Angeles, CA, February 28-March 1.

[15] Kvasny, L., Trauth, E.M. & 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* Special Issue on ICTs and Social Inclusion. Volume 7, Number 2/3: 96-118.

[16] Bandura, A. (1993). “Perceived Self-efficacy in Cognitive Development and Functioning”. *Education Psychologist*, *28*(2), 117-148.

[17] Oyserman, D., & Markus, H. R. (1993). ”The Sociocultural Self”. In J. Suls (Ed.), *Psychological Perspectives on the Self* (pp. 187-220). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

[18] Kahn, J. H., & Nauta, M. M. (2006). “College Student Career Development”. In J. H.

[19] Lent, R. W., Brown, S. D., & Larkin, K. C. (1986). “Self-Efficacy in the Prediction of Academic Performance and Perceived Career Options”. *Journal of Counseling Psychology*, 33¸ 265-269.

[20] Schunk, D.H. & Meese, J.L. (1992). *Students Perceptions in the Classroom*, Hillsdale, NJ: Lawrence Erlbaum Associates.

[21] Joshi, KD, Trauth, E., Kvasny, L. Kulturel, S., & Mahar, J. (2010). “Choosing IT as a Career: Exploring the Role of Self-Efficacy and Perceived Importance of IT Skills”, *International Conference on Information Systems.*

[22] Shapiro, J. R., & Neuberg, S. L. (2007). “From Stereotype Threat to Stereotype Threats: Implications of a Multi-Threat Framework for Causes, Moderators, Mediators, Consequences, and Interventions”. *Personality and Social Psychology Review, 11*(2): 107-130.

[23] Oyserman, D., Fryberg, S. A., & Yoder, N. (2007). ”Identity-Based Motivation and Health”. *Journal of Personality and Social Psychology, 93*(6): 1011-1027.

[24] Jackson, L. A., Ervin, K. S., Gardner, P. D. & Schmitt, N. (2001). “Gender and the Internet: Women Communicating and Men Searching”. *Sex Roles: A Journal of Research*, 44(5-6): 363-379.

[25] Appiah, O. (2004). “Effects of Ethnic Identification on Web Browsers' Attitudes Toward and Navigational Patterns on Race-Targeted Sites”. *Communication Research*, *13*(3), 312-337.

[26] Airhihenbuwa, C. O. (1995). *Health and Culture*. Thousand Oaks, CA: Sage.

[27] Cultural Access Group. (2001). *Ethnicity in the Electronic Age: Looking at the Internet through Multicultural Lens*. Access Worldwide Communications. Retrieved November 6, 2006, from http://www.accesscag.com/internet%20report%20v.pdf

[28] Cockburn, C. (1985). *Machinery of Dominance: Women, Men, and Technical Know-How*. London: Pluto press.

[29] Margolis, J. & Fischer, A. (2003). *Unlocking the Clubhouse: Women in Computing*, Cambridge: The MIT Press.

[30] Wajcman, J. (1991). *Feminism Confronts Technology*. University Park: The Pennsylvania University Press.

[31] Lyons, S., Sweitzer, L. & Ng, E. (2009). “The Shifting Nature of Careers in Canada: A Framework for Research”, ASAC, Niagra Falls: Ontario.

[32] 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.

[33] Trauth, E., Joshi, K.D., Kvasny, L., Chong, J., Kulturel, S, & Mahar, J. (2010). "Millennials and Masculinity: A Shifting Tide of Gender Typing of ICT?", Proceedings of the Americas Conference on Information Systems, Lima, Peru, August 12-15.

[34] Benyo, J. & 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.

[35] Gallivan, M., Truex, D. & Kvasny, L. (2004). "Changing Patterns in IT Skill Sets 1988-2003: A Content Analysis of Classified Advertising", *Database for Advances in Information Systems*, 35(3), 64-87.

[36] Trauth, E.M., Farwell, D.W., & Lee, D. (1993). "The IS Expectation Gap: Industry Expectations versus Academic Preparation", *MIS Quarterly*, 17(3), 293-307.

[37] Wynekoop, J.L. & Walz, D.B., (2000). "Investigating Traits of Top Performing Software Developers", *Information Technology & People*, 13(3): 186-202.

[38] Todd, P.A., McKeen, J.D., & Gallupe, R.B. (1995). "The Evolution of IS Job Skills: A Content Analysis of IS Job Ads", *MIS Quarterly*, 19(1): 1-37.

[39] Walstrom, K.A, Schambach, T.P., Jones, K.T, & Crampton, W.J. (2008). "Why Are Students Not Majoring in Information Systems?," *Journal of Information Systems Education,* 19(1): 313-319.

[40] Medlin, B.D., Dave D.S., & Vannoy, S.A. (2001). "Students' Views of the Importance of Technical and Non-technical Skills for Successful IT Professionals", *The Journal of Computer Information Systems, 42*(1): 65-69.

[41] Martz, B. & Cata, T. (2008). "Students' Perception of IS Academic Programs, IS Careers, and Outsourcing", *Journal of Education for Business,* 82(2): 118-125

[42] Van Gelderen, M., Brand, M., van Praag, M., Bodewes, W., Poutsma, E. & van Gils, A. (2008)."Explaining Entrepreneurial Intentions by Means of the Theory of Planned Behaviour".*Career Development International*, 13 (6): 538-559.

[43] Arbona, C. & Novy, D.M. (1991). "Career Aspirations and Expectations of Black, Mexican-American, and White Students". *Career Development Quarterly, 39* (3), 231-239.

[44] Byars, A.M., & McCubbin, L.D. (2001). "Trends in career development research and Practice With Diverse Cultural and Gender Groups", *Journal of Career Development*, *37*(1), 215-217.

[45] Fouad, N.A., & Brown, M. (2000). "Race, Ethnicity, Culture, Class and Human Development". In S.D. Brown & R.W. Lent (Eds.) *Handbook of Counseling Psychology* (3rd ed., pp. 379-410). New York: Wiley.

[46] Chung, Y. B., & Harmon, L. W. (*1999*). "Assessment of Perceived Occupational Opportunity for Black Americans". *Journal of Career Assessment*, 7, 45-62.

[47] Perrone, K.M., Sedlacek, W.E., & Alexander, C.M. (*2001*). "Gender and Ethnic Differences in Career Goal Attainment". *Career Development Quarterly*, 50, 168-178.

[48] Phinney, J. S., & Alipuria, L. L. (1990). "Ethnic Identity in College Students from Four Ethnic Groups". *Journal of Adolescence*, 13, 171-183.

[49] Huang, H., Kvasny, L., K. D. Joshi, Trauth, E. & Mahar, J. (2009). "Synthesizing IT Job Skills Identified in Academic Studies, Practitioner Publications and Job Ads". Proceedings of the ACM SIGMIS/CPR Conference, Limerick, Ireland, May 28 – 30.