

Understanding the Under Representation of Women in IT: Toward a Theory of Individual Differences¹

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ABSTRACT

Among the research challenges in studying the under representation of women in the IT field is that of developing appropriate theory to provide a basis for understanding and explanation about this gender imbalance. At present, there are two dominant theories in the gender literature that are used to explain the participation of women in the IT profession. The *essentialist* perspective dichotomizes gender based upon the presumption of significant inherent differences between women and men. This view finds the causes of gender under representation in biology. The *social construction* perspective focuses on the social construction of IT as a male domain, which is interpreted as incompatible with the social construction of female identity. This view finds the causes of gender under representation in the IT sector. The research discussed in this paper is directed at the development of a new theory that focuses on *individual differences* among women as they relate to the needs and characteristics of IT work and the IT workplace. This view finds the causes of gender under representation in the socio-cultural environment that shapes each woman's gender identity and her professional development, and her individual responses to these influences.

Categories and Subject Descriptors

H.1 Models and Principles, K.7 The Computing Profession, K.4 Computers and Society.

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General Terms

Management, Human Factors, Theory.

Keywords

Diversity, feminism, feminist theory, gender, gender equity, IT workforce, women and IT, IT profession, IS careers, IS professionals, IT careers, IT professionals, gender issues, gender differences, individual differences theory, theory.

1. INTRODUCTION

One of the research challenges in studying the under representation of women in the IT field is the lack of sufficient theory to provide a basis for understanding and explanation about this gender imbalance. There are two dominant theories in the gender literature that are used to explain the participation of women in the IT profession. The *essentialist* perspective dichotomizes gender based upon the presumption of significant inherent differences between women and men. This view finds the causes of gender under representation in biology. The *social construction* perspective focuses on the social construction of IT as a male domain, which is interpreted as incompatible with the social construction of female identity. This view finds the causes of gender under representation in the IT sector. The research discussed in this paper is directed at the development of a new theory that focuses on individual differences among women as they relate to the needs and characteristics of IT work and the IT workplace. This view finds the causes of gender under representation in the socio-cultural environment that shapes a woman's gender identity and her professional development, and her individual responses to these influences.

The goal of this research is to investigate – at the individual level of analysis -- the particular ways that women IT professionals in America are influenced by and react to the social shaping of both

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gender identity and IT. The first step in achieving this goal -- and the subject matter of this paper -- is to develop a better understanding of those individual and environmental factors that are influencing American women in their professional development and current working lives as IT professionals.

This paper is structured as follows. First, we provide a brief overview of the theory of individual differences and situate it within the extant theories about gender and IT. Then we present data from a field study of gender and IT that is directed at refining this emergent theory. Finally, we present the contribution of this research to both theory and practice.

2. BACKGROUND

The need for an alternative theory of gender and IT to account for the under representation of women in the IT workforce emerges from consideration of the assumptions underlying the two prevailing theories about women and IT. In her initial work on the individual differences theory, Trauth (2002) analyzes this gap and makes the case for an alternative theory to occupy the space between essentialism and social construction.

Essentialism is the assertion of fixed, unified and opposed female and male natures (Wajcman 1991 p. 9). The existence of biological difference between the sexes has led to a tendency to assume that other observed differences between men and women are due to biological determinates as well (Marini, 1990). With respect to IT, this theory focuses on inherent differences between men and women to explain the observed differences in their relationship to IT. It attributes observed differences in men's and women's behavior to what are believed to be inherent, fixed, group-level differences that are based upon bio-psychological characteristics. Essentialism underlies research on gender and IT that views gender as a fixed variable that is manipulated within a positivist epistemology (e.g. Dennis, Kiney and Hung 1999; Gefen and Straub 1997; and Venkatesh and Morris 2000). Adam et al.'s (2001) analysis of this perspective points out that focusing on a background literature of psychology, alone, places too much emphasis on individual gender characteristics where a form of essentialism may creep in. Looking only to psychological explanations of observations without giving attention to the influence of context² adopts a determinist stance with respect to gender.

An inference that can be drawn from an essentialist approach to gender and IT research is that women and men should be treated differently. For example, Venkatesh and Morris (2000, p. 131) recommend that trainers adopt different approaches toward men and women and that marketers design different marketing campaigns for men and women. An extrapolation from this line of thinking to IT workforce considerations is that there ought to be two different workforces: a "women in IT" workforce and a "men in IT" workforce. Thus, policies for addressing the gender imbalance would focus on differences between women and men and the equality issue would focus on "separate but equal."

An alternative explanation for women's relationship to information technology looks to societal rather than biological

forces. The literatures of gender and technology in general (e.g. Cockburn 1983, 1988; Cockburn and Ormrod 1993; Wajcman 1991) and that of gender and information technology, in particular (e.g. Adam, et al. 1994; Balka and Smith 2000; Eriksson, et al. 1991; Lovegrove and Segal 1991; Slyke, et al. 2002; Spender 1985; Star 1995; Webster 1996) look to social construction theory (Berger and Luckmann 1966) rather than biological and psychological theories. According to this view, the social shaping of information technology as "men's work" places IT careers outside the domain of women.

Recommendations for addressing this situation vary. One school of thought based on a multi-year project to study the reasons for female under-representation in university-level information technology education and within the IT profession explores the development of strategies to help women fit in to this male domain (e.g. Nielsen et al. 1998, 1999, 2000; Pringle et al., 2000; von Hellens et al., 2000, 2001). Another school of thought focuses on the need to reconstruct the world of computing to become more of a "female domain." For example, Webster (1996) focuses on the social shaping of female gender identity and the implication for women's relationship to workplace technologies. Spender (1995) offers yet another perspective. Based on analysis of women as a social group in cyberspace, she predicts an influx of female values into this new virtual world that will accompany increased female presence.

Wajcman's (1991) analysis of the social constructivist perspective on gender and technology reveals other issues and assumptions. First, there is no universal definition of masculine or feminine behavior; what is considered masculine in some societies is considered feminine or gender-neutral in others. Second, while gender differences exist they are manifested differently in different societies. Hence, addressing the gender gap in IT employment based upon an assumed "woman's perspective" is problematic.

It can be argued that both perspectives view gender and technology as fixed with the difference being the basis for "fixing" gender. What both of these theories have in common is the assumption that women in the IT profession, as a group, are different from men, as a group, either for sociological, biological or psychological reasons. This suggests some gaps in the theoretical options available for analyzing gender and IT. This gap can be addressed by developing an alternative understanding of the way in which social shaping of gender and the IT profession operates: at an individual level.

This theory of individual differences emerges from three sources. First, it is informed by the use of individual differences in the psychological literature. For example, Jennings (1941) explains that an individual must be studied as a part of their relations with other individuals when using individual differences theory. McCauley and Thangavelu (1991) use individual differences to explain how stereotypes can be perceived differently from person to person. Nelson (1990) uses interactional framework to represent a comprehensive approach to individual adjustments of information-driven technologies. Second, we draw upon earlier work by the first author, which investigated the skills and knowledge of IT professionals (Lee, et al. 1995; Trauth 1993; Trauth, et al. 1993). Finally, this theory builds upon prior research by the first author on gender and IT (Beekjuyzen et al. 2003; Kwan, et al. 1985; Trauth, 1995; Trauth et al. 2000; von Hellens

² See Wilson and Howcroft (2000) for an example of how context enriches the analysis of observed differences in behavior toward IT based upon gender.

et al. 2001). This theory focuses on the similarities among men and women as individuals, and the variation among members of each gender group with respect to IT skills and inclination to participate in the IT sector. It looks to socio-cultural interpretation of IT work and power relations to explain the level of participation by women in IT. It is in this way that it represents an individual differences perspective on gender and IT (Trauth 2002). According to this theory, both gender and IT are socio-culturally constructed at the individual level. That is, women, as individuals, experience a range of different socio-cultural influences which shape their inclinations to participate in the IT profession in a variety of individual ways. Further, women respond in a range of individual ways to the social shaping of gender and IT work. Thus, the individual differences perspective inhabits the middle ground between the essentialist and the social constructivist explanations of the under representation of women in the IT profession. Gallivan (2003) has employed this individual differences theory to explain how different employees deal with and experience stress in the workplace in different ways.

3. METHODOLOGY

The purpose of this study is to engage in empirically-grounded theory development. That is, the emergent theory of individual differences is being used to guide the investigation of personal characteristics and socio-cultural influences that might be correlated with the under representation of women in the IT profession and the way they operate at the individual level. The empirical data that is being used to test the explanatory power of this emergent theory comes from the first phase of a multi-year study of socio-cultural influences on women in the American IT workforce. In order to explore these influences, interviews with women practitioners and academics were carried out in three different geographical regions of the US: Northeast (Massachusetts), Southeast (North Carolina) and Mid Atlantic (Pennsylvania). These three locations were chosen in order to increase the variation in socio-cultural and economic characteristics of study participants as well as the variation in participants' work and living environments. In addition, these three regions represent the different levels that the IT labor force contributes to the regional economy, a factor that might influence the acceptability of women working in IT occupations in those regions. The kinds of societal variation that are sought include: racial, ethnic and lifestyle variation; the cost of living; attitudes toward women, women working and women working in IT, and the role of the IT sector in the local economy.

The interview protocol being used is based upon an instrument used in prior gender and IT research (Trauth et al. 2003). It was, then, adapted to include new constructs that arose from the findings from this prior research, and the theory development goals of this current research project. Open ended interviews with study participants lasting typically 90 minutes in duration, were conducted. These interviews were tape recorded for subsequent transcription and analysis. As the interviews were being transcribed, the coding scheme was developed. The coding was oriented toward analyzing interview data in support of theory development/refinement. This coding scheme was developed collaboratively by the three authors. It was an iterative process that began with the interview protocol and then was elaborated upon as themes emerged from the interview transcripts. These

transcripts were then coded and stored in computer-analyzable form using NUD*IST N6 qualitative analysis software.

4. RESULTS

Since the objective of this field study is the refinement of a theory of individual differences to explain the participation of women in the IT workforce, data collection and analysis was directed at investigating the ways in which the respondents – as individual women – are experiencing and responding to socio-cultural influences. Forty-four women were interviewed between October 2002 and December 2003. Nine of these interviews were conducted in Massachusetts, eight were conducted in Pennsylvania and 14 were conducted in North Carolina. In addition, thirteen academics were interviewed (as shown in Table 1). These women represent a range of ages, levels of management responsibility, educational backgrounds, and degrees of technical specialization. The academics represent a similar diversity of backgrounds, including variation in IT disciplines (e.g. engineering, computer science, MIS, and information science/systems). The women represent a wide range of ages from twenty-three to fifty-seven with the average age being forty-three. The racial make-up of the women includes Caucasians, African Americans, Asian Americans, Hispanics and Middle Easterners. In addition, thirty of the women are married or in a committed relationship, whereas thirteen women are single, divorced or widowed (one relationship status is unknown). Forty-two women have bachelor's degrees, twenty six women have master's degrees and fifteen women have PhDs. The degree concentrations range from typical IS, CS, engineering and MIS programs to psychology, nursing, communication, math, and liberal arts. Furthermore, the current job titles include professors of IS and MIS/business, program/project manager, software architect, quality assurance engineers, IT administrators, system and web developers, and small IT business owners. This interview is being supplemented by participant observation data and by documentary data about gender and the IT sector in the regions involved in the study. The purpose is to develop the socio-cultural context within which the interview data can be situated.

Table 1 Interview Category

Category	# of Interviewees
Massachusetts	9
Pennsylvania	8
North Carolina	14
Academics	13
Total	44

The constructs that emerged from analysis of the empirical data and that were used to develop the coding scheme fall into three broad categories: personal data, shaping & influencing factors, and environmental context. These constructs help us to better understand the individual and environmental factors that are influencing American women in their decisions about an IT career, in their professional development, and in their career progression as IT professionals. They form the structure of the conceptual framework of individual differences that is shown in Table 2 and is discussed in the following section.

Table 2 A Conceptual Framework of Individual Differences

Personal Data	Demographic data	Age Ethnicity Gender Nationality Race Religion Sexual orientation
	Lifestyle data	Children Family background Family work background Spouse/partner
	Workplace data	Career characteristics Industry type Job title Technical level Type of IT work
Shaping & influencing Factors	Personal characteristics	Education Interests & abilities Personality traits IT identity Gender identity
	Personal influences	Exposure to computing Educational experiences Life experiences Role models & mentors
Environmental context	Cultural attitudes & values	Attitude toward women, women working, women working in IT Academic attitudes toward women (in general, in IT) Workplace attitudes toward women (in general, in IT)
	Geographic data	Location Population History
	Economic data ³	Employment overall Information economy employment ⁴
	Policy data	Relevant laws and policies

³ Economic and policy data are not yet collected. However, for purposes of conceptual completeness, these categories are shown in this framework.

⁴The term information economy as used, here, follows Trauth's (2000) use of the term to describe that portion of the labor force involved in primary information sector activities (development of IT tools and services) or secondary information sector activities (use of IT tools in other businesses).

5. INDIVIDUAL DIFFERENCES FRAMEWORK

5.1 Personal Data

Personal data includes descriptive data about the participant. It is this data that is correlated with individual women's differences in experience, influence and responses to them. *Demographic data* contains data relating to membership in particular groups within the population such as race or ethnicity. *Lifestyle data* refers to descriptors of the person's life, past and present. Included in this would be socio-economic class while growing up and employment type of parents. *Workplace data* refers to information about the participant's IT career. This construct is important for refining our notion of "IT work" as it relates to the under representation of women with respect to it.

5.2 Shaping and Influencing Factors

According to the individual differences theory factors that have an influence on a woman's decision to enter and remain in the IT field are a combination of personal characteristics possessed by the individual and influences experienced by that individual. Personal characteristics refer to such factors as: educational background; personality traits; interests and abilities; IT identity (e.g. is one a 'geek' or a 'nerd'); and gender identity (e.g. what behaviors, etc. one associates with being female). Personal influences refers to the people and experiences who have influenced the respondent to become who she is within the IT profession. These include such factors as: early experiences with computing, role models, mentors and other significant others; significant life experiences (such as early death of a parent, father out of work or divorce);

5.3 Environmental Context

The environmental data provides the context within which the person's responses can be situated. Cultural attitudes & values refer to attitudes about work, IT work or women that can inform interpretation of the respondent's life/career story. These would include experiences of regional cultural attitudes toward women and experiences of employing organization's attitudes toward women. Geographic data refers to contextual information about the particular geographic region in which the interview is conducted, including its history and population characteristics. Economic and policy data provide additional socio-cultural context. Research on gender and IT in Ireland has shown that the more important an information economy is to a national economy, the more open-minded are the attitudes regarding women working in the IT field (Trauth 1995, 2003). This concept has been imported into the research described in this paper. In fact, one rationale for the choice of the three states is that each one represents a different degree to which its information economy contributes to the overall state economy.

6. CONCLUSION

This paper is directed at contributing to our understanding about the under representation of women in IT so as to inform efforts to enhance diversity in the IT workplace. This is achieved on two levels. First, this paper makes a scholarly contribution through the development of a theory that aids understanding about the factors influencing the participation of women – as individuals -- in the IT field. Analysis of the empirical data shows support for the theory of

individual differences; a theory that can inform subsequent research and help explain and predict the participation of women in the IT profession. While the application in this paper is to women and IT, this theory has also been applied to consideration of socio-cultural factors that help to explain the participation of other under represented groups in the IT profession (Kvasny and Trauth, 2002).

Second, the results from this field study of American women who are successful participants in the IT profession can also be used to support recommendations for proactive responses by public policy makers, employers and educators. More specifically, this research makes a contribution to practice by informing management and human resources practices regarding recruitment and retention of women and under represented groups in the IT profession. The implications of using the individual differences theory to understand the under representation of women in the IT profession relate to both recruitment and retention strategies. At present, it seems that more attention is being paid to recruitment of those who have successfully navigated the educational and socio-cultural barriers. But parallel effort is needed for retention strategies. This issue is addressed in Tapia, et al. (2004). By informing both research and practice, the individual differences theory can be used to support and evaluate societal and workplace interventions directed at redressing the under representation of women in IT.

Future research will involve two more rounds of interviews along with the collection and analysis of environmental context data involving economic and public policy data. The objective of the data analysis is to document the nature of these types of environmental influences on the study participants. That is, we will seek to know whether there is any systematic pattern to the type and strength of these influencing factors.

7. REFERENCES

- [1] Adam, A., Howcroft, D. and Richardson, H. (2001), "Stormy weather: the gender dimension of research debates in IS," International Federation for Information Processing, Working Group 8.2 Conference, Boise, Idaho, July 27-29.
- [2] Adam, A., Emms, J., Green, E., and Owen, J. (Eds) (1994), *Women, Work and Computerization: Breaking Old Boundaries – Building New Forms*, North-Holland, Amsterdam.
- [3] Balka, E. and Smith, R. (Eds) (2000), *Women, Work and Computerization: Charting a Course to the Future*, Kluwer Academic Publishers, Boston.
- [4] Berger, P.L. and Luckmann, T. (1966), *The Social Construction of Reality: A Treatise in the Sociology of Knowledge*, Doubleday, New York.
- [5] Beekjuyzen, J., von Hellens, L. Nielson, S. and Trauth, E.M. 2003. "Women Talking about IT Work - Duality or Dualism?" *Proceedings of the ACM SIGCPR/MIS Conference* (Philadelphia, PA, April).
- [6] Cockburn, C. (1983), *Brothers: Male Dominance and Technological Change*, Pluto Press, London.
- [7] Cockburn, C. (1988), *Machinery of Dominance: Women, Men, and Technical Know-how*, Northeastern University Press, Boston.
- [8] Cockburn, C. and Ormrod, S. (1993), *Gender and Technology in the Making*, Sage, London.

- [9] Dennis, A.R., Kiney, S.T. and Hung, Y. (1999), "Gender differences in the effects of media richness," *Small Group Research*, Vol. 30, No. 4, pp. 405-437.
- [10] Eriksson, I.V., Kitchenham, B.A. and Tijdens, K.G. (Eds) (1991), *Women, Work and Computerization: Understanding and Overcoming Bias in Work and Education*, North-Holland, Amsterdam.
- [11] Gallivan, M. (2003). Examining Gender Differences in IT Professionals' Perceptions of Job Stress in Response to Technical Change. *Proceedings of the 2003 ACM SIGMIS Conference*, Philadelphia, Pennsylvania, pp. 10 – 23.
- [12] Gefen, D. and Straub, D. (1997), "Gender differences in the perception and use of e-mail: an extension to the technology acceptance model," *MIS Quarterly*, Vol. 21, No. 4, pp. 389-400.
- [13] Jennings, H. H. (1941). Individual Differences in the Social Atom. *Sociometry*, Vol. 4, No. 3, pp. 269 – 277.
- [14] Kvasny, L. and Trauth, E.M. (2002). "The 'Digital Divide' at Work and Home: Discourses about Power and Underrepresented Groups in the Information Society," in *Global and Organizational Discourse about Information Technology*. E. Wynn, M.D. Myers and E.A. Whitley (Eds.). Boston: Kluwer Academic Publishers: 273-291.
- [15] Kwan, S.K.; Trauth, E.M.; and Driehaus, K.C. (1985), "Gender differences and computing: students' assessment of societal influences," *Education and Computing*, Vol.1, No. 3, pp. 187-194.
- [16] Lee, D.M.S., Trauth, E.M., Farwell, D., Kuramoto, L. and Winslow, C. (1995), "Critical skills and knowledge requirements of the IS profession: a joint academic/industry investigation," *MIS Quarterly*, Vol. 19, No. 3, pp. 313-340.
- [17] Lovegrove, G. and Segal, B. (Eds) (1991), *Women into Computing: Selected Papers 1988-1990*, Springer-Verlag, London.
- [18] Marini, M. M. (1990). Sex and Gender: What Do We Know? *Sociological Forum*, Vol. 5, No. 1, pp. 95 – 120.
- [19] McCauley, C. and Thangavelu, K. (1991). Individual Differences in Sex Stereotyping of Occupations and Personality Traits. *Social Psychology Quarterly*, Vol. 54, No. 3, pp. 267 – 279.
- [20] Nelson, D. L. (1990). Individual Adjustment to Information-Driven Technologies: A Critical Review. *MIS Quarterly*, Vol. 14, No. 1, pp. 79 – 98.
- [21] Nielsen, S., von Hellens, L. and Wong, S. (2000), *The Game of Social Constructs: We're Going to WinIT!* Griffith University, School of Computing and Information Technology Working Paper Series. Griffith University, Brisbane, Australia.
- [22] Nielsen, S., von Hellens, L., Greenhill, A. and Pringle, R. (1998), "Conceptualising the influence of cultural and gender factors on students' perceptions of IT studies and careers," *Proceedings of the 1998 ACM SIGCPR Computer Personnel Research Conference*.
- [23] Nielsen, S., von Hellens, L., Pringle, R. and Greenhill, A. (1999), "Students' perceptions of information technology careers: conceptualising the influence of cultural and gender factors for IT education," *GATES*, Vol. 5, No.1, pp. 30-38.
- [24] Pringle, R., Nielsen, S., von Hellens, L., Greenhill, A. and Parfitt, L. (2000), "Net gains: success strategies of professional women in IT," in Balka, E. and Smith, R. (Eds), *Women, Work and Computerization: Charting a Course to the Future*. Kluwer Academic Publishers, Boston.
- [25] Slyke, C. V., Comunale, C. L. and Belanger, F. (2002). Gender Differences in Perceptions of Web-Based Shopping. *Communications of the ACM*, Vol. 45, No. 7, pp. 82 – 86.
- [26] Spender, D. (1995), *Nattering on the Net: Women, Power and Cyberspace*, Spinifex Press Pty Ltd, North Melbourne, Victoria.
- [27] Star, S.L. (Ed) (1995), *The Cultures of Computing*, Blackwell Publishers, Oxford.
- [28] Tapia, A.H., Kvasny, L., and Trauth, E.M. (2004). "Is There a Retention Gap for Women and Minorities? The Case for Moving In Versus Moving Up," in M. Igarria and C. Shayo (Eds), *Strategies for Managing IS/IT Personnel*, Idea Group Publishing, Hershey, PA, pp. 143 -164.
- [29] Trauth, E.M. (2003). "Diversity, Gender and the IT Professions," Gender and IT Workshop, University of Salford, Manchester, UK, May.
- [30] Trauth, E.M. (2002), "Odd Girl Out: An Individual Differences Perspective on Women in the IT Profession," *Information Technology and People*, Vol. 15, No. 2, pp. 98-118.
- [31] Trauth, E.M. (2000). *The Culture of an Information Economy: Influences and Impacts in the Republic of Ireland*. Dordrecht, The Netherlands: Kluwer Academic Publishers.
- [32] Trauth, E.M. (1995), "Women in Ireland's information industry: voices from inside," *Eire-Ireland*, Vol. 30, No. 3, pp. 133-150.
- [33] Trauth, E.M. (1993). "Educating Information Technology Professionals for Work in Ireland: An Emerging Post-industrial Country," *Global Information Technology Education: Issues and Trends*, M. Khosrowpour and K. Loch (eds.) Harrisburg, PA: Idea Group Publishing: 205-233.
- [34] Trauth, E.M., Farwell, D. and Lee, D. (1993), "The IS expectation gap: industry expectations versus academic preparation," *MIS Quarterly*, Vol.17, No.3, pp. 293-307.
- [35] Trauth, E.M., Nielsen, S. and von Hellens, S. (2000), "Explaining the IT gender gap: Australian Stories," *Proceedings of the 10th Australasian Conference on Information Systems*.
- [36] Trauth, E.M., Nielsen, S.H., and von Hellens, L.A. 2003. "Explaining the IT Gender Gap: Australian Stories for the New Millennium," *Journal of Research and Practice in IT*, Volume 35, Number 1: 7-20.
- [37] Venkatesh, V. and Morris, M. G. (2000), "Why don't men ever stop to ask for directions? gender, social influence, and their role in technology acceptance and user behavior," *MIS Quarterly*, Vol. 24, No.1, pp. 115-139.
- [38] von Hellens, L., Nielsen, S. and Trauth, E.M. (2001), "Breaking and entering the male domain: women in the IT industry," *Proceedings of the 2001 ACM SIGCPR Computer Personnel Research Conference*.

- [39] von Hellens, L., Pringle, R., Nielsen, S., and Greenhill, A. (2000), "People, business and IT skills: the perspective of women in the IT industry," *Proceedings of the 2000 ACM SIGCPR Computer Personnel Research Conference*.
- [40] Wajcman, J. (1991), *Feminism Confronts Technology*, The Pennsylvania University Press, University Park, PA.
- [41] Webster, J. (1996), *Shaping Women's Work: Gender, Employment and Information Technology*, Longman, London.
- [42] Wilson, M. and Howcroft, D. (2000), "The role of gender in user resistance and information systems failure," in Easkerville, R., Stage, J. and DeGross, J.I. (Eds), *Organizational and Social Perspectives on Information Technology*, Kluwer Academic Publishers, Boston.