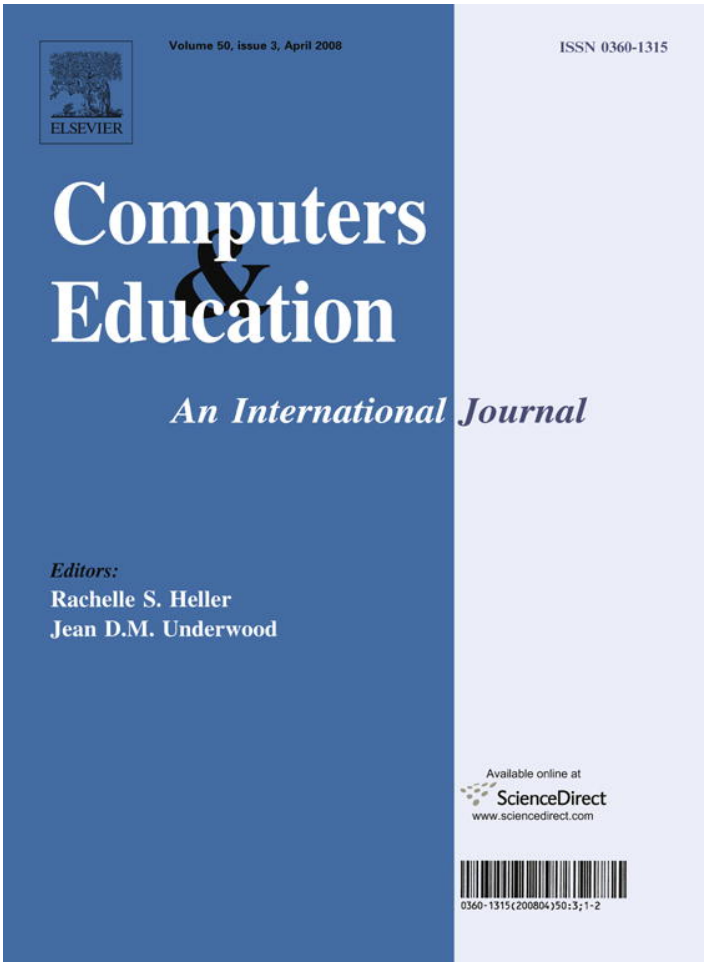

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Participation in class and in online discussions: Gender differences

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Abstract

Gender differences between participation in face-to-face and web-based classroom discussions were examined, by comparing the men–women actual participation ratio to the men–women attendance (or login) ratio. It was found that men over-proportionally spoke at the face-to-face classroom whereas women over-proportionally posted messages in the web-based conference. Two alternative explanations are discussed. It is suggested that either women prefer written communication more than men do, or that women prefer written communication over spoken communication. Nonetheless, despite some advantages of virtual discussions, especially for women, the online environment is apparently not attractive enough for either gender.

Keywords: Computer-mediated communication; Distance education; Gender studies; Pedagogical issues

1. Introduction

Despite the importance often assigned to participation in classroom discussions, it has been repeatedly found that most students do not participate (e.g., Caspi, Chajut, Saporta, & Beyth-Marom, 2006; Crombie, Pyke, Silverthorn, Jones, & Piccinin, 2003; Gorsky, Caspi, & Trumper, 2004). For example, Crombie and her colleagues (2003) reported that 64% of the students never, rarely, or only occasionally asked or responded to a question in the classroom. Caspi and his colleagues (2006) recently reported that about 55% of the students never or rarely participated in class. Women avoid participation in classroom discussions more than men. The present study aims to explore this gender difference. The main question of this study is whether differences between two learning environments – the traditional university classroom and the web-based instructional environment (WBIE) – affect the rate of participation by gender.

A large body of research is devoted to gender differences in classroom behavior (e.g., Canada & Pringle, 1995; Cornelius, Gray, & Constantinople, 1990; Crombie et al., 2003; Fassinger, 1995; Sadker & Sadker,

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1994; Younger, Warrington, & Williams, 1999). The main finding is that women tend to speak less frequently and confidently than their male classmates. Instructors interact with male students more frequently, ask them better questions, and give them more precise and helpful feedback (Sadker & Sadker, 1994). Although female students initiate more interactions than do male students, male students receive more follow-up (Canada & Pringle, 1995). In general, men dominate the classroom discussion.

One leading explanation for the domination of men in classroom discussions is the "chilly climate" (Hall & Sandler, 1982, 1984). This term relates to a cluster of kinds of systematic discrimination that disadvantage women in an academic environment. Crombie and her colleagues (2003) gave the following examples that manifest such behavior: sexist use of language; presentation of stereotypic views of women; and instructors favoring male students. They noted that the existence of this construct was documented in many studies, though some did not find it.

In comparison to participation in the face-to-face classroom, participation in the web-based instructional environment (WBIE) tends to be even lower (see Caspi et al., 2006). Regarding the influence of gender on participation, some studies found equal participation of women and men in WBIE (e.g., Davidson-Shivers, Morris, & Sriwongkol, 2003; Graddol & Swann, 1989; Masters & Oberprieler, 2004; McConnell, 1997; McLean & Morrison, 2000; Ory, Bullock, & Burnaska, 1997; Poole, 2000). However, other studies found gender differences either in the number of participants, type of participation, or dynamics of participation. It is noted that women have been found to enroll in online courses at a higher rate than men (Thompson, 1998). Arbaugh (2000) reported that women begin with a high level of participation that decreases over time and increases toward the end of the course, while men's participation is stable but on a moderate level. Barrett and Lally (1999) found that the mean length of messages sent to an online seminar by male students was, on average, more than twice as long as messages sent by female students. Sierpe (2001) found that a very small male minority dominated the conversational floor. In addition, regarding the type of participation, Sierpe reported that men were more likely to contribute to topical discussions and more likely to send multiple contributions to individual discussions. Jaffe and his colleagues (1999) found that women, more than men, exhibited communication patterns of social interdependence (such as references to others, self-reference, supporting references, and emotional discourse) in academic asynchronous discussions. Yates (2001) concluded that gender differences found in face-to-face classrooms can also be found in WBIE with men engaging in similar tactics of exclusion and delegitimation. Like all communications media, web-based communication suffers from the intrusion of existing social relations, including those that are based upon inequalities of access and power.

Nevertheless, Gunn and her colleagues (2003) found that women logged in, posted and read more messages than their male counterparts on the course bulletin board. Wolfe (2000) found that the same females who were thoroughly marginalized in in-class, face-to-face discussions achieved complete parity with males in computer-mediated discussion groups. This study also found that women were more likely than men to express a preference for the online format. Bostock and Lizhi (2005) reported that all-women groups posted more messages than all-men groups. In mixed-gender groups women posted more messages than men, but fewer than in all-women groups. Men in mixed-gender groups posted more messages than in all-men groups. Bostack and Lihzi concluded that the presence of men deterred women's writing. However, Pollock, Hamann, and Wilson (2005) found that in balanced-gender groups, students of both sexes wrote longer messages, and posted more statements that signaled interaction with other participants. In addition, voices of female students were expressed more strongly in online than in face-to-face courses, and this contributed in turn to greater perceived deep learning (Anderson & Haddad, 2005). It was also found that when anonymity was allowed, women contributed strong assertive remarks, even though they did not engage in heated debates in face-to-face classrooms (Bellman, Tindimubona, & Arias, 1993).

Thus, it is possible that the "chilly climate" did not migrate from the traditional face-to-face environment to the web-based environment. Other factors may be responsible for differences in participation of men and women in WBIE. First, men may perceive the purpose of learning via WBIE as an easy and economical way to learn, while women may view it as a way to increase collaborative learning (Arbaugh, 2000). In the same vein, Giannini-Gachago and Seleka (2005) reported that men asked questions and made statements more than women, while women responded more than men. If students hold different perceptions regarding the purpose of the environment, they may participate in different ways. Second, since it was claimed that women prefer web-mediated learning (Belanger, 1999, but see Anderson, 1997 for an opposite view), it is reasonable to

expect that they would participate more in a web-based environment than in the face-to-face classroom. In the present study, participation in the two learning environments is compared. Clearly, the two environments have different attributes (see, for example, Caspi et al., 2006), that may influence men and women differently.

2. Measuring participation

There are three common methods to measure participation in a learning environment. The first is to count the number of students who take part in the discussion and then compare the number of men with the number of women. The main problem with this method is that a difference can occur simply because of a disproportionate number of men and women. A second method counts the number of times each participant in the class spoke or posted a message. While the first method counts the number of participants, the second method counts the number of expressions. By so doing, we can test the volume of interactions for each gender. This method still suffers the same problem inherent in the first method. The third method compares the actual participation by gender to the gender distribution baseline (e.g., Canada & Pringle, 1995). This method takes into account the men–women ratio in a given environment. Gender dominance was measured by the following steps: First, calculating the men–women ratio *within* each environment; second, calculating the men–women participation ratio (talking or posting); and third comparing the actual participation ratio to the actual attendance (or login) ratio. Differences in gender participation rates *between* environments may reflect the influence of the environment.

In this study, we made no attempt to explore qualitative differences such as message types and communication patterns. Here, both instructional environments were optional for students; that is, neither attendance nor logging in were mandatory nor gave credit; thus active participation was entirely voluntary.

3. Method

3.1. Background and population

The present study was conducted at the Open University of Israel which is a distance learning institution. Upon registration, students receive the course materials (mainly written materials designed for distance learning), a time schedule and a set of assignments. During the semester, students have the option to participate in face-to-face tutorial sessions located near their place of residence. Tutorial sessions are equivalent to typical face-to-face sessions in a classroom. The web-based instructional environment is a course website which contains additional study materials as well as administrative information and a discussion forum. It is noted that students who participate in the discussion forum are identifiable by name, but the course administrator may allow anonymous participation. Login to and posting on the course website is optional, and, like participation in face-to-face tutorials, not graded.

The course ''Research Methods'' is a basic course for all Social Science students. In the Fall 2005 semester, 1368 students enrolled in the course. Each of the 48 tutorial groups throughout the country had about 30 registered students. Age range of the students was 18–57, mean: 29.2 (SD: 5.55), and 72.3% were under the age of 30. Men students were slightly older than their women counterparts (means: 30.3, SD: 5.84, and 28.3, SD: 5.15, respectively, $t(1366) = 6.76$, $p < 0.001$).

3.2. Procedure

3.2.1. Classroom observation

During the twelfth week of the semester, one observer sat in on four different tutorial sessions, each led by a different instructor, and counted students' participating events. Initially, the observer classified each event as ''question'', ''answer'', ''comment'' or ''back-and-forth dialogue''. For the current study's purpose these events were summed up.

3.2.2. WBIE analysis

Since communication in the course forum is asynchronous we analyzed the log file of weeks 10–12 of the semester. These weeks were chosen because at this time the subject matter under discussion in the forum was

equivalent to that in the tutorials. For each student, the log file contains his/her identity number, name, the number of days the student logged into the course forum, and the number of messages posted by the student. In this course anonymous posting was not permitted.

4. Results

4.1. Gender distribution base rate

Of the 1368 students enrolled the course, 775 were women (56.7%) and 593 were men (43.3%). In the four tutorials observed, 60 students were women (63.2%) and 35 were men (36.8%). Of the 785 students who logged into the WBIE, 459 students were women (58.5%) and 326 were men (41.5%). In order to rule out the possibility that attendance or login did not represent the actual men–women distribution in this course, gender ratio of the attendees and of the students who logged in to the WBIE was compared to the gender ratio of the enrolled students.

It was found that there are no men–women ratio differences among students who attended tutorials, among students who logged into the WBIE and total student enrollment in the course (p'$s > 0.35$ in the Chi square test). It is also possible that login frequency to the WBIE differed between genders. Fig. 1 presents the distribution of the average number of days between successive logins for women and men, which was clearly very similar.

4.2. Active participation

Table 1 shows that 42 women spoke at tutorials (60.8%) as opposed to 27 men (39.2%). This distribution did not significantly differ from the attendance base line ($p > 0.7$ in the Chi-square test). Ninety-six women (63.2%) posted at least once to the WBIE, as opposed to 56 men (36.8%). Again, this distribution did not significantly differ from the login base rate ($p > 0.2$). 70% of the women who attended the tutorial actively participated, as compared to 77.1% of the men who attended. Only 20.9% of the women who logged in to the WBIE posted messages, compared to 17.2% of the men who logged in. A comparison of these two distributions did not

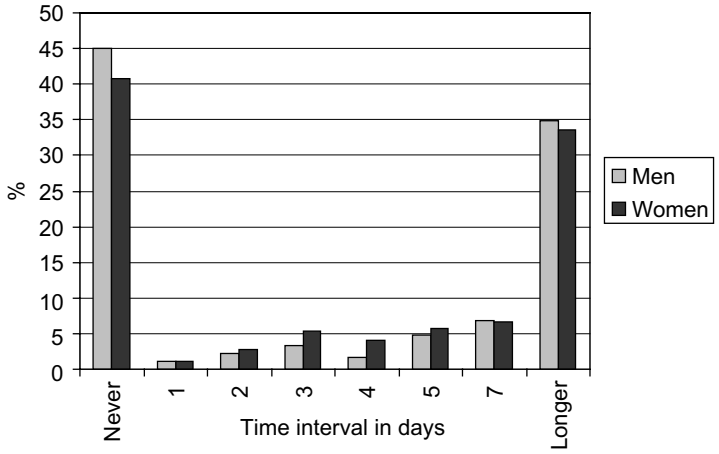

Fig. 1. Distribution of the average time interval (in days) between successive logins to the course forum for women and men.

Table 1
Gender distributions (in %)

	Enrollment	Class		WBIE	
		Attendance	Participation	Login	Participation
Men	43.3	36.8	39.2	41.5	36.8
Women	56.7	63.2	60.8	58.5	63.2

approach significance (both p's > 0.7). Clearly, active participation in the two environments differed to a large extent, while gender difference within each environment was relatively small.

Counting the number of times each student spoke at a tutorial, we found that 269 events (51.9%) were made by women and 249 events (48.1%) were made by men. This distribution differed significantly from the attendance base rate, $\chi^2(1) = 4.07$, $p < 0.05$. Thus, the volume of interactions made by men in the tutorial is much higher than their relative number. Women posted 261 messages to the WBIE (70.2%) whereas men posted only 111 (29.8%), a distribution that also differed significantly from the login base rate, $\chi^2(1) = 14.67$, $p < 0.001$. Thus, although there was only a small majority of women in WBIE they dominated this environment in terms of the volume of interactions.

Comparing the volume of interactions in the classroom and in the WBIE, we found a significant difference, $\chi^2(1) = 29.87$, $p < 0.0001$. Men, relative to the base rate, talked over-proportionally at the face-to-face tutorials, while women posted messages over-proportionally to the web-based forum.

To clarify these results, a further analysis was conducted. We compared the average participation of men and women within each environment by averaging the number of events (talk or post) each gender group generated. This analysis includes those students who never actively participated. It was found that, on the average, men spoke at tutorials 7.06 times whereas women spoke, on the average, 4.55 times $t(49) = 1.45$, $p = 0.07$ (note: since the two gender groups did not have equal variance, the degrees of freedom were corrected). A discrepant result was found in the WBIE: On the average, women posted 0.33 times each while men did so only 0.18 times, $t(1366) = 2.34$, $p < 0.02$.

5. Discussion

This study quantitatively explored gender differences in traditional and in web-based learning environments. We found gender differences only regarding the volume of interactions for each gender; that is, the number of times students spoke at tutorials or posted a message in the WBIE. We found no differences between the enrollment base rate and either the attendance at the optional tutorial sessions or the logging into the non-mandatory course forum. In addition, there was no difference between the proportion of active participants by gender and the attendance or login base rates.

The results obtained in the classroom corroborated earlier studies. We cannot, however, attribute these findings to the "chilly climate" construct, simply because the observer did not look for evidence for the existence of discriminating behavior. Nevertheless, these findings set a reasonable level for comparison between the two environments.

In some studies that controlled gender base rate, it was found that women posted more than men (Bostock & Lizhi, 2005). However, Masters and Oberprieler (2004) found equal participation despite an unequal gender base rate. In Masters and Oberprieler's study, men and women posted an equal number of messages although only about 25% of the students were men. In other words, men posted over-proportionally relative to the base rate. In contrast, our findings show that women posted more than men. Why are women, relative to base rate, overrepresented in the Web-base environment and under-represented in traditional face-to-face tutorials? We offer two alternative explanations that point to the structural differences between the two environments: Either women prefer written communication more than men do, or women prefer written communication over spoken communication. Regarding the first explanation, it has been documented that women prefer web-based communication more than men do (Boneva, Kraut, & Frohlich, 2001; Bostock & Lizhi, 2005; Jackson, Ervin, Gardner, & Schmitt, 2001; Leung, 2001; Wolfe, 2000). A higher level of women's participation in web-based communications is expected given that utilizing computers in general is becoming more common amongst women (Astleitner & Steinberg, 2005; Ray, Sormunen, & Harris, 1999). In addition, there is no gender difference in actual computer ownership (Li & Kirkup, in press) and in computer competency (Bunz, Curry, & Voon, in press; Hargittai & Shafer, 2006). A higher level of women's participation in web-based communications is also expected because it has also been found that the gender gap in terms of Internet access has disappeared (Wasserman & Richmond-Abbott, 2005), and that the Internet may offer less male-dominated social experiences.

Some discriminating behaviors observed in classrooms may be reduced in WBIE. In asynchronous communication, men can not interrupt the message, and responsiveness is determined by the participant's own choice.

Moreover, while in face-to-face tutorials the audience is visible, in asynchronous discussion groups participants are completely invisible, unless they post messages. Thus, while in the classroom, women may be deterred from active participation because of an *expected*, *imagined* or *actual* threatening climate, in WBIE they may feel less intimidated. The notion that the Internet provides a protected environment is well documented (see, e.g., Amichai-Hamburger, 2005).

There is very limited support in the literature for our second explanation, that women prefer written communication to spoken communication. Byrne and Findlay (2004) found that women prefer sending a written message (SMS) to making a telephone call when initiating a romantic date with a male partner. Such a preference was not found among men. Nonetheless, this finding may be restricted to the risky circumstance of taking the first step in a date. Ling (2002) reported that young women (under the age of 25) used SMS more than voice in their cellular phones. For this age group, he also showed that women sent SMS messages more than men and spoke on the phone less than men, an observation that may support the explanation that women may prefer written means of communication. However, these findings disappeared in older age groups. Most students examined in the current study were also young, thus this interpretation may be valid, although further research are needed.

In order to more fully understand the findings from this study, we suggest taking into account the extreme difference between the two environments: Students participated in tutorials to a much greater degree than they did in the WBIE. About 40% of the students never logged in to the WBIE, and most of those who did, did not post messages. This finding corroborates earlier results that compared participation in these two learning environments (Caspi et al., 2006). Thus, despite some advantages offered by WBIE, especially for women, this environment is apparently not attractive enough for either gender. Participation in online environments depends upon the nature of the activity and its perceived value by the students (see Kirkwood & Price, 2005). Recognizing the potential for women to express themselves in WBIE may raise the number of women who participate, which in turn may contribute to more in-depth learning and higher achievements.

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References

Amichai-Hamburger, Y. (2005). Personality and the Internet. In Y. Amichai-Hamburger (Ed.), *The social net: Understanding human behavior in cyberspace* (pp. 27–55). Oxford, UK: Oxford University Press.

Anderson, T. (1997). Integrating lectures and electronic course materials. *Innovations in Education and Training International, 34*(1), 24–31.

Anderson, D.M., & Haddad, C.J. 2005, Gender, voice, and learning in online course environments, Journal of Asynchronous Learning Networks, 9(1). Available online at http://www.sloan-c.org/publications/jaln/v9n1/v9n1_anderson.asp#anderson7.

Arbaugh, J. B. (2000). An exploratory study of the effects of gender on student learning and class participation in an Internet-based MBA course. *Management Learning, 31*, 503–519.

Astleitner, H., & Steinberg, R. (2005). Are there gender differences in web-based learning? An integrated model and related effect sizes. *AACE Journal, 13*(1), 47–63.

Barrett, E., & Lally, V. (1999). Gender differences in an on-line learning environment. *Journal of Computer Assisted Learning, 15*(1), 48–60.

Belanger, M. (1999). The social impacts of information and communication technologies. Schoolnet Program Industry, Ed-Media 1999, Canada.

Bellman, B., Tindimubona, A., & Arias, A. Jr., (1993). Technology transfer in global networking: Capacity building in Africa and Latin American. In L. Harasim (Ed.), *Global networks: Computers and international communication* (pp. 237–254). Massachusetts: MIT Press.

Boneva, B., Kraut, R., & Frohlich, D. (2001). Using e-mail for personal relationships: the difference gender makes. *American Behavioral Scientist, 45*(3), 530–549.

Bostock, S. J., & Lizhi, W. (2005). Gender in student online discourse. *Innovations in Education and Teaching International, 42*(1), 73–85.

Bunz, U., Curry, C., Voon, W. (in press). Perceived versus actual computer-email-web fluency. Computers in Human Behavior.

Byrne, R., Findlay, B. 2004. Preference for SMS versus telephone calls in initiating romantic relationships, Australian Journal of Emerging Technologies and Society, 2(1). Available online at http://www.swin.edu.au/sbs/ajets/journal/issue2/ByrneFindlaySMS.pdf.

Canada, K., & Pringle, R. (1995). The role of gender in college classroom interactions: a social context approach. *Sociology of Education, 68*, 161–186.

Caspi, A., Chajut, E., Saporta, K., & Beyth-Marom, R. (2006). The influence of personality on social participation in learning environments. *Learning and Individual Differences, 16*(2), 129–144.

Cornelius, R. R., Gray, J. M., & Constantinople, A. P. (1990). Student–faculty interaction in the college classroom. *Journal of Research and Development in Education, 23*, 189–197.

Crombie, G., Pyke, S. W., Silverthorn, N., Jones, A., & Piccinin, S. (2003). Students' perception of their classroom participation and instructor as a function of gender and context. *Journal of Higher Education, 74*(1), 51–76.

Davidson-Shivers, G., Morris, S. B., & Sriwongkol, T. (2003). Gender differences: are they diminished in online discussions? *International Journal on e-learning, 2*(1), 29–36.

Fassinger, P. A. (1995). Professors' and students' perceptions of why students participate in class. *Teaching Sociology, 24*, 25–33.

Giannini-Gachago, D., Seleka, G. 2005. Experiences with international online discussions: Participation patterns of Botswana and American students in an Adult Education and Development course at the University of Botswana, International Journal of Education and Development using ICT, 1(2). Available online at http://ijedict.dec.uwi.edu/viewarticle.php?id=42.

Gorsky, P., Caspi, A., & Trumper, R. (2004). Dialogue in a distance education physics course. *Open Learning, 19*, 265–277.

Graddol, D., & Swann, J. (1989). *Gender voices*. London: Basil Blackwell.

Gunn, C., McSporran, M., Macleod, H., & French, S. (2003). Dominant or different? Gender issues in computer supported learning. *Journal of Asynchronous Learning Networks, 7*(1), 14–30.

Hall, R. M., & Sandler, B. R. (1982). *The classroom climate: a chilly one for women*. Washington, DC: Project on the Status and Education of Women, Association of American Colleges.

Hall, R. M., & Sandler, B. R. (1984). *Out of the classroom: a chilly campus climate for women?* Washington, DC: Project on the Status and Education of Women, Association of American Colleges.

Hargittai, E., & Shafer, S. (2006). Differences in actual and perceived online skills: the role of gender. *Social Science Quarterly, 87*(2), 432–448.

Jackson, L., Ervin, K., Gardner, P. D., & Schmitt, N. (2001). Gender and the Internet: women communicating and men searching. *Sex Roles, 44*(5/6), 363–379.

Jaffe, J. M., Lee, Y., Huang, L., & Oshagan, H. (1999). Gender identification, interdependence, and pseudonyms in CMC: language patterns in an electronic conference. *The Information Society, 15*(4), 221–234.

Kirkwood, A., & Price, L. (2005). Learners and Learning in the 21st Century: what do we know about students' attitudes and experiences of ICT that will help us design courses? *Studies in Higher Education, 30*(3), 257–274.

Leung, L. (2001). College student motives for chatting on ICQ. *New Media and Society, 3*, 483–500.

Li, N., & Kirkup, G. (in press). Gender and cultural differences in Internet use: A study of China and the UK. Computers & Education.

Ling, R. (2002). *The social and cultural consequences of mobile telephony as seen in the Norwegian context*. Fornebu: Telenor R&D.

Masters, K., & Oberprieler, G. (2004). Encouraging equitable online participation through curriculum articulation. *Computers and Education, 42*, 319–332.

McConnell, D. (1997). Interaction patterns of mixed sex groups in educational computer conferences. Part 1: Empirical findings. *Gender and Education, 9*(3), 345–363.

McLean, S., & Morrison, D. (2000). Sociodemographic characteristics of learners and participation in computer conferencing. *Journal of Distance Education, 15*(2), 17–36.

Ory, J. C., Bullock, C., & Burnaska, K. (1997). Gender similarity in the use of and attitudes about ALN in a university setting. *Journal of Asynchronous Learning Networks, 1*(1), 1–16.

Pollock, P. H., Hamann, K., & Wilson, B. M. (2005). Teaching and learning online: assessing the effect of gender context on active learning. *Journal of Political Science Education, 1*, 1–15.

Poole, D. M. (2000). Student participation in a discussion-oriented online course: a case study. *Journal of Research on Computing in Education, 33*(2), 162–177.

Ray, C. M., Sormunen, C., & Harris, T. M. (1999). Men's and women's attitudes toward computer technology: a comparison. *Office Systems Research Journal, 17*(1), 1–8.

Sadker, M. P., & Sadker, D. M. (1994). *Failing at fairness: how America's schools cheat girls*. New York: Scribners Sons.

Sierpe, E. (2001). Gender and participation in computer-mediated LIS education topical discussions: an examination of JESSE, the Library/Information Science Education Forum. *Journal of Education for Library and Information Science, 42*(4), 339–347.

Thompson, M. M. (1998). Distance learners in higher education. In C. C. Gibson (Ed.), *Distance learners in higher education: Institutional responses for quality outcomes* (pp. 9–24). Madison, WI: Atwood Publishing.

Wasserman, I. M., & Richmond-Abbott, M. (2005). Gender and the Internet: causes of variation in access, level, and scope of use. *Social Science Quarterly, 86*(1), 252–270.

Wolfe, J. (2000). Gender, ethnicity, and classroom discourse. *Written Communication, 17*(4), 491–519.

Yates, S. J. (2001). Gender, language and CMC for education. *Learning and Instruction, 11*, 21–34.

Younger, M., Warrington, M., & Williams, J. (1999). The gender gap and classroom interactions: reality and rhetoric? *British Journal of Sociology of Education, 20*(3), 325–341.