# GENDER DIFFERENCE IN AN ONLINE ASYNCHRONOUS DISCUSSION PERFORMANCE

Abdullah Topçu
Measurement and Evaluation Office, Army School of Language
(Department of Primary Education, Boğaziçi University, Part-time Instructor)
abdullah.topcu@boun.edu.tr

**ABSTRACT**
The study examined the gender difference in an online asynchronous discussion which was an integral part of a face-to-face undergraduate course. It was carried out with 30 fourth grade math pre-service teachers in the faculty of education at a university. The content analysis of the online discussion was performed according to Henri's model (1992). The messages in this online discussion were assessed by a grading rubric developed by the researcher with the inspiration from the rubric of Topcu and Ubuz (2004), and Henri's model of cognition and interactivity. The interrater reliabilities for objectivity on content analysis in the dimension of cognitive skills, interactivity and message composition were .76, .87 and .91, respectively, which can be taken to represent excellent agreement beyond chance. The findings indicated that there was no significant gender difference in the online asynchronous discussion performance when pre-service teachers' prior success and, their computer and web experience were controlled. The study suggests that an instructor should use facilitative questions to deepen interaction and develop feeling of confidence rather than to clarify the content of the course in the asynchronous online discussion.

**Key Words:** Gender, Online Discussion, Content Analysis

## ÇEVRİMİÇİ ASENKRON TARTIŞMA PERFORMANSINDA CİNSİYET FARKI

**ÖZET**
Çalışma, yüzyüze lisans dersinin tümleyen bir parçası olan çevrimiçi asenkron tartışmada cinsiyet farkını araştırmıştır. Bir üniversitenin eğitim fakültesinindeki 30 dördüncü sınıf öğretmen adayı öğrencisiyle çalışma yürütülmüştür. Çevrimiçi tartışmaların içerik analizi Henri (1992) modeliyle yapılmıştır. Topçu ve Ubuz'un (2004) ölçeği ve Henri'nin bilişsel ve etkileşim modelinden esinlenerek geliştirilmiş olan ölçek ile çevrimiçi tartışmalardaki mesajlar değerlendirilmiştir. İçerik analizinde nesnelliği sağlamak için hesaplanan kodlayıcılar arası tutarlık; bilişsel boyutta .76, etkileşim boyutunda .87 ve mesaj kompozisyonu boyutunda ise .91'dir. Bu değerler iyi olarak kabul edilebilir. Öğretmen adayı öğrencilerin önceki ders başarıları ile bilgisayar ve web deneyimlerini kontrol altında tutan analizde, çevrimiçi asenkron tartışma performansında cinsiyet farkı bulunmamıştır. Çalışma; öğretmenlerin, çevrimiçi asenkron tartışmalarda ders içeriğiyle ilgili açıklamalar yapmaktan çok, etkileşimi derinleştirecek ve güven hissini geliştirecek yönlendirici sorular kullanmasını önermektedir.

**Anahtar Sözcükler:** Cinsiyet, Çevrimiçi Tartışma, İçerik Analizi

## 1. INTRODUCTION
Online discussion is considered to be a learning environment in which students can achieve higher conceptual knowledge through interaction of knowledge and experience among all students (Harasim, 1993). In this sense, most online learning systems try to put online discussion forum for providing online learning community (Im & Lee, 2004). Online discussion has increasingly become an integral part of fully-online or face-to-face teaching in universities, because it increases participation and collaborative thinking through providing of asynchronous, nonhierarchical and reciprocal communication environment (Garrison & Anderson, 2003). Altun (2005) reported that the most current use of online learning environment is asynchronous and students prefer asynchronous online discussion because of its convenience. However, online learning environment which is challenging traditional education is evolving its own pedagogy (McDonald, 2002).

Communication, rather than individual acquisition, has recently been emphasized as a means of increasing quality of instruction. Online discussion as a tool for promoting "conversational modes" of learning can lead to enhanced learning outcomes for students such as engagement in learning task, deeper levels of understanding, increased metacognition, increased motivation and divergent thinking. However, the common misconception of the online discussion forum is that it is virtual learning environment in which students are likely to learn as much from one another as from course materials or lectures (Thomas, 2002). In fact, what they learn can be seen not so much as a product, but as a creative cognitive process of offering up ideas, having them criticized or experienced on, and being able to synthesize ideas in the light of peer discussion (Garrison, Anderson, & Archer, 2001).

Similarly, Bates (1995) noted that students engage in higher order processing of information by reflecting on peers' contribution in online discussions. So articulating their own understanding lead them to construct personal meaning which is not individualized, but rather a product of peers' interaction.

As instructors move toward increasing use of information and communication technologies, as a means of supporting learning, it is necessary to evaluate the learning outcomes by considering the potential confounding factors such as gender, class, socially constructed categories etc. (Thomas, 2002). In studies of computing and online discussions, gender is often used to mark discussions of women and their relationships to technology, and their role in computer culture itself (Yates, 1997). Much of the discourse is concerned with the inequalities of access, use and role faced by women. Herring's (2001) review of the research on gender differences in online discussions reported that men and women have recognizably different styles in electronic posting and that they also have different ethical standards for what are appropriate and desirable postings. Herring reported that men's postings tended to be lengthy and frequent, characterized by strong assertions, authoritativeness, distancing, self-promoting. In contrast, the postings of women are mainly personal and include queries and information. Moreover women, however, were found to be contributing more interactive messages than men (Barett & Lally, 1999). Guzetti and Fey's (2001) examinations of 10 empirical studies of gender and electronic text revealed three major themes (1) online discussion only sometimes empower females to develop voice (2) preventing gender bias in online discussion was problematic (3) groups and partners could either help foster or deter gender equity in electronic discussion. The lack of face-to-face cues in online discussion is seen as equating online discussion to some kind of dial speech situation, but it does not mean that women participated in the discussion more than men (Yates, 1997; Herring, 2001) though online discussion places emphasizes on what is said and removes seemingly extraneous aspects of face-to-face communication (Sproull & Keisler, 1991).

Participation, critical/creative thinking and engagement in the learning task which are provided in the online discussion forum yield effective learning and high students' achievement (Jonassen, 2000; Tam, 2000). However, while online discussion appears to be good for learning and achievement, it must be recognized that it is highly mediated. While some of recent research has taken this mediation to be beneficial for learning outcomes, it is possible that gender and the nature of online discussion may interact with each other in the dimension of students' cognitive levels and consequently male and female may have various performances in the online discussion forum.

Having established these facts, the study presented in this paper was designed to provide an analysis of students' online discussion performance (DP) in order to understand better the gender effect. The students' Grand Point Average (GPA) (previous course successes) and, Computer and Internet (WWW) Experience (CIE) were considered as confounding factors that can affect the discussion performance. The following research question was formulated in this study:

Is there a significant gender difference in the asynchronous online discussion performance when students' GPA and online learning environment experience are controlled?

## II. METHOD
### Participants
The study was carried out in a university in which medium of instruction is English during the fall semester of 2005 in the course titled as "Computer-assisted Math Instruction". The sample consisted of 30 pre-service teachers enrolled at fourth year level. There were 17 females and 13 males in the sample with all of the students between the ages 21 and 23. All of them took an "Introduction to Computer" course at the first year level and have been using computer regularly. Of these students, 76 % of the females and 54 % of the males took the "Instructional Technology and Materials Development" course. It is stated that most students (90 %) either frequently surf the Web or perceive the Web as central of their studies / works. Only seven female and three male pre-service teachers took a fully online course previously.

### Software
The online discussion forum was created with "PhpBB" software and placed on the central university server and was accessible over the Internet by using a computer with an Internet connection and web-browsing software. Every tools and functions are in English. Students are able to access to the online discussion forum with a username and password given to them. PhpBB had also the capacity to provide synchronous communication. The web-interface presenting students' contributions is in the following structure:

      Discussion Thread
          Main Topic
              Response

Response

Forum administrator is able to open more than one thread and more than one topic under each thread. Forum administrator can create groups, assign a moderator to the group, regulate time span in the discussion, specify group members, put limitations to a member in terms of IP number or e-mail address or any other ID information and keep any statistics related to the content of messages in terms of words, member name, time etc.

Students are able to access to the online discussion at any time during the specified period either from a computer at home or from the public computer laboratories in the universities. They can send messages with containing emoticons and multimedia materials (picture, sound, videos).

**Procedure**
The study was conducted by the researcher as instructor at the fall semester of the 2005-2006 academic years. The online discussion was integrated into the existing three-credit undergraduate course "Computer-Assisted Mathematics Teaching" which is instructed in four periods (two in class, two in lab) weekly. This online discussion forum was specifically designed to provide virtual learning space in which pre-service teachers could engage in a conversational mode of learning toward higher order learning outcomes. Five discussion threads which were units of the course were run through the semester for a period of one week each except the first one. These threads are Semantic Network, Drill and Practice, Hypermedia, Asynchronous Communications and Evaluation of the Educational Software. The applications of these threads were in the third, fourth, tenth, $12^{th}$ and $13^{th}$ week of the semester, respectively. The first one lasted two weeks because student needed to overcome inexperience in the discussion forum and its software. These discussion threads and their main topics were selected so that they would facilitate learning and increase understanding of the content in the traditional classroom. Therefore, the instructor did not attempt to elicit specific "correct" responses from students but rather outlined major issues pre-service teachers were expected to promote discussions on. Most importantly, main topics were worded to promote students' critical reflection on issues central to the course.  As examples for the main topics;

"What are the learning activities with drill and practice? *(Question that ask for more evidence)*
How should we use drill and practice in the web based learning environment? *(Question that ask for clarification)*

The online discussion was explicitly embedded within the course web site. Three times participations in terms of messages in the online discussion was compulsory for all pre-service teachers in a one week period (from Monday 5 p.m. to Sunday 5 p.m.) and contributed 20 % of their overall grade for the course. On enrollment in the course, pre-service teachers were given detailed instruction on the operations of the online discussion forum, including information on logging-in, navigation within the forum and step-by-step how to post a new message. Some of the rules for the messages were as follows: (1) Messages should not contain more than 150 words, (2) Messages must be written in English,   (3) Messages should be written in formal Writing structure, (4) Each message should have a topic and (5) Students should reflect on their friends' ideas in the messages, criticize them or make inferences about their ideas. At the beginning of each main topic instructor acted as facilitator of the discussion, encouraging pre-service teachers and "seeding" the discussion with initial input. After these, instructor's interaction was kept to a minimum level except for the about purposes.

**III. DATA ANALYSIS**
A number of models for the evaluation of the quality of learning are available in the literature. The focus of these frameworks varies, depending on the purposes of the evaluation and the interest of the researchers. For example, Henri's (1992) model focused on the level of participation and interaction in the discussion group, as well as analyzing the content of the messages according to a cognitive view of learning. Later, Newman, Webb and Cochrane (1995) applied Henri's model and Garrison's (1992) critical thinking approach to develop strategies to measure critical thinking in face-to-face and computer-supported group learning while Gunawardena, Lowe and Anderson (1997) developed method for analysis of an online debate and look for evidence for the social construction of knowledge.  Frankly, the model developed by Henri (1992) has been influential in the content analysis research in the last decade. In this model, the transcripts are analyzed according to five broad dimensions; these are participative, interactive, social, cognitive, and metacognitive. The present study used the cognitive and interactive dimensions of the model to develop a grading rubric for the discussion performance and to provide insight for learning process through an analysis of the message content. Henri's model for the cognitive skills and interactivity are outlined in the Table 1 and 2.

An objective determination of the unit of meaning in content analysis is difficult to make. The researcher selected the safe way for the content analysis by following Henri's (1992) idea and message was used as the unit of analysis. Message texts in the discussion forum were first copied to a Microsoft Word file, organized

according to the "threads" of the online discussion and their chronological order. A sample of the coding organization matrix is demonstrated in Table 3. As seen in the table, transcripts do not contain any information of the message sender's identity (gender, name, etc.). The coding was done on a hard copy of the transcript. Coding of the message was conducted by the researcher and an Information Sciences doctoral student with 13 years of teaching experience. The coders' decisions were compared for reliability. The primary test of objectivity in content analysis is interrater reliability. Cohen's kappa statistic was used to determine it which is a chance corrected measure and assumes two raters, in cases and mutually exclusive and exhaustive nominal categories (Cappozoli, McSweeney, Sinha, 1999). The Cohen's kappa for their coding is .76 for cognitive skills, .87 for interactivity and .91 for message composition analysis, which can be taken to represent excellent agreement beyond chance.

**Table 1:** Cognitive Skills Model

| Reasoning Skills | Codes | Definitions | Indicators |
|---|---|---|---|
| Elementary Clarification | EC | Observing or studying problem and observing their linkages in order to acquire a basic understanding. | Identifying relevant elements, Reformulating the problem, Asking relevant question, |
| In-depth Clarification | IC | Analyzing and understanding a problem to an understanding which sheds light on the values, beliefs, and assumptions. | Defining the terms, Identifying assumptions, establishing referential criteria, |
| Inference | IN | Induction and deduction, admitting or proposing an idea on the basis of its links with propositions already admitted as true. | Drawing conclusions, making generalizations, formulating propositions. |
| Judgment | JU | Making decisions, statements, appreciations evaluations, sizing up. | Judging the relevance of solutions, making value judgments, judging inferences. |
| Strategies | ST | Proposing co-ordinated actions for the application of a solution | Deciding on the action to be taken proposing one or more solutions interacting with those concerned. |

**Table 2:** Interactivity Model

| Category | Codes | Definitions | Indicators |
|---|---|---|---|
| Explicit Interaction | EI | Any statements referring explicitly to another message, person, or group | "..in response to Ali's message 53" |
| Implicit Interaction | II | Any statement referring implicitly to another message, person, or group | "I think the solution is…." |
| Independent Statement | IS | Any statement relating to the subject under discussion, but which is neither an answer nor a commentary and which does not lead to any further statements. | "After examining the problem, I think that…." |

Researcher developed the grading rubric by inspiring from the grading rubric developed previously by the researchers Topcu and Ubuz (2004) and the grading rubric developed by Debbie King of Sheridan College (Palloff and Pratt, 2003). This rubric given in Table 4 gave clear direction to the pre-service teachers, reduces or eliminates any disagreements about grading at the end of the course and also encourages the interactivity and high level cognitive thinking by announcing its effect on their grades. Mean and standard deviations of the pre-service teachers' discussion scores were used to have a general understanding for the learning process. Furthermore one way of covariance analysis (ANCOVA) was conducted to explain whether there is a gender

difference in the online discussion performance when pre-service teachers 'prior success and experience in the web and computer were controlled.

**Table 3:** Sample discussion forum message coding

| Content of the message<br>Written message by Pre-service teacher 18 (PT 18) | Message # | Time | Interactivity | Cognitive Skills |
|---|---|---|---|---|
| PT 14 said that "otherwise, computer will be the teachers and students will be passive as they copy knowledge from the net."<br>I do not agree PT14 in some way. Students can not be passive learners when they are engaged in a web based instruction which contains simulations, drill and practice, and games that are designed to teach concepts, rules properties of something or etc.<br>.........<br>As a conclusion, whether the students will be active or passive learners depended on what they will use as a learning material. Besides, the teacher's teaching skill has also a role in making the students active or passive learners. If the teacher does not tell the students the purpose of, for example, playing with simulations related to a topic, then the students will not know what they are expected to do and to learn. So they cannot learn anything on account of not having knowledge about the learning material. | 12 | Thu Dec 01, 2005 10:18 am | EI | JU |

**Table 4:** Grading rubric of the message for Discussion Performance

| Criteria | Definitions | Scores | Max Scores |
|---|---|---|---|
| Cognitive levels | All discussion on EC | 3 | |
| | At least one example of discussion on IC | 4 | 5 |
| | At least one example of discussion on IN or JU or ST | 5 | |
| Interactivity | Explicit or implicit interaction | 3 | 3 |
| | Independent Statement | 1 | |
| Message Composition | Having title, obeying rules of compositions, clear and correct sentences etc. | 2 | 2 |

**IV. FINDINGS**

Table 5 and 6 summarize the descriptive statistics for the cognitive levels and interactivity in the messages with respect to Henri's model. As seen below, proportion between female and male tends to the female site in the first three levels whereas it tends to the male site in the last two levels. Moreover, males sent EI type messages more than female and females sent II types messages more than males. The mean and standard deviation of their discussion scores and GPA with respect to the gender is demonstrated in Table 7. There is significant mean difference between male and female in the GPA, $t(28) = 3.801$, $p = .001 < .05$.

Table 5: Distribution of the Cognitive Levels with respect to Gender

| Gender (%) | Cognitive Levels [a] (%) | | | | |
|---|---|---|---|---|---|
| | EC | IC | IN | JU | ST |
| Female (57) | 67 | 63 | 69 | 47 | 42 |
| Male (43) | 33 | 37 | 31 | 53 | 58 |

[a] EC = Elementary Clarification; IC = In-depth Clarification; IN = Inference; JU = Judgment; ST = Strategies

**Table 6:** Distribution of the Interactivity with respect to Gender

| Gender (%) | Interactivity Levels [a] (%) | | |
|---|---|---|---|
| | EI | II | IS |
| Female (57) | 42 | 60 | 55 |
| Male (43) | 58 | 40 | 45 |

[a] EI = Explicit Interaction; II = Implicit Interaction; IS = Independent Statement.

**Table 7:** Descriptive Statistics for Discussion Performance

| Gender | GPA[a] Mean | GPA Std. Dev. | DP[b] Mean | DP Std. Dev. |
|--------|---------|----------|---------|---------|
| Female | 2.81 | .31 | 7.55 | 1.49 |
| Male | 2.35 | .34 | 7.94 | .86 |

[a] GPA = Grand Point Avarage; [b] DP =Discussion Performance;

The hypothesis on asynchronous online discussion performance predicted that there is no significant difference between female and male pre-service teachers when their GPA and CIE are controlled. Prior to conducting ANCOVA two independent variables, GPA and CIE, were predetermined as potential confounding variables to statistically equalize the differences between female and male. The potential covariates were correlated with the dependent variable (Discussion performance). The correlations and their significance appear in Table 8. Both of the confounding variables had significant correlation with the dependent variable. Therefore, they remained in the covariate set for the inferential statistics.

**Table 8:** Correlations between the variables

| Variables | Gender | GPA[a] | CIE[b] | DP[c] |
|-----------|--------|--------|--------|-------|
| Gender | 1 | | | |
| GPA | -.583** | 1 | | |
| CIE | -.238 | .539** | 1 | |
| DP | -.279 | .706** | .513** | 1 |

**Correlation is significant at the 0.01 level (2-tailed)
[a] GPA = Grand Point Avarage; [b] CIE =Computer and Internet Experience; [c] DP= Discussion Performance

Furthermore, assumption of homogeneity of regression should be satisfied to be able to conduct ANCOVA. It requires that the regression of dependent variable on covariates must be constant over different values of the group membership. To check this assumption, Multivariate Regression and Correlation (MRC) was conducted using enters method for each variable to test the significance of $R^2$ change for two interaction terms produced by multiplying the group membership with the covariates, separately. The contribution of interactions is not significant for the DP [$F_{(2, 24)} = 2.184$, p= .134]. These results indicated that, there were no significant interactions between covariates and the group membership; therefore the interaction set can be discarded, and thus excluded from further inferential statistical analyses. The result of the one-way ANCOVA revealed that there is no significant mean difference on DP between female and male when GPA and CIE are controlled, $F_{(1, 26)} = 1.913$, p= .178>.05

## V. DISCUSSION, IMPLICATIONS AND CONCLUSIONS
Female and male pre-service teachers had similar online discussion performances though prior success of the females was significantly higher than the males. Similar to the discussion performance, cognitive levels in the messages of the females and males were also parallel. These findings add a new variable to the domain of variables on which there is an insignificant gender difference and also support the previous research findings about the insignificant gender difference on WWW for surfing and Internet for learning (Isman, 2002; Herring, 2001). Nevertheless, males sent messages at the cognitive levels "judgment" and strategies" more than females whereas females sent messages at the cognitive levels "elementary clarification" and "inference" more than males. Moreover, females tended to send messages at II level while males tended to send messages at EI level.

Although female pre-service teachers' GPA was higher than male pre-service teachers' GPA their online discussion scores were very similar. This could be explained in several ways. The first and the most important one is that females had excessive amount of difficulties in providing messages at the cognitive levels, JU and ST. Since these students were the majority of the class and had sincere relationships with each other, their participation might be imperfect, less clear and insufficient in the online discussions. The second one is the authoritative flaming and leading messages of the males in the forum. They caused females to send more messages in the cognitive levels "elementary clarification" or "inference". For instance, student 17 (female) wrote in some part of the message to her friend as "you probably have misunderstood and been aggressive to me. In fact, I intended that drill and practice should not be used at the beginning of the lesson when we need to summarize content of the previous lessons". Thirdly, the number of females was higher than the males and it might have caused males to send more JU messages in order to dominate female-rich medium in which the level

of high acquaintance. Above conditions might imply that if online asynchronous discussion is conducted as an integral part of a face-to-face course, instructor should stress on the "virtual places" aspect of the online discussion and encourage students to express and share all of their ideas as if they would discuss all the matters only in this platform.

The message chain -female message (initiating statement) → male message (response) → female message (response)"- "FMF" throughout discussion constitute of the 47% of the total discussion chain. At first glance, the reason seems to be the majority of the females in the group; However, it could also imply that females sent compact messages and they needed clarification. Furthermore, it might mean that females try to persuade males of their ideas. Therefore, males might send more "JU" and "ST" level messages and females might send more EC and IN level messages. It could also explain why females sent more messages at II level more than males. Probably, this case might moderately explain high discussion scores of the males. In fact, high discussion scores of the males were realized even though three males' interest and motivation were quite lower than other males and they decreased the mean of the males' discussion scores. These conclusions suggest that instructor should use excessive amount of facilitative questions to deepen interactions and to develop feeling confidence rather than clarifying the content of the course. In other words, facilitative questions should aim primarily to promote "conversation modes" of the discussion rather than to enhance learning outcomes.

Issues of access and gaining sufficient experience for the online environment do not eliminate the problems of female students in the participation, because female students need more social interactions and feeling of goodness; and also the lack of face-to-face aspect of online discussion forums removes the basis for discrimination and exclusion. In other words, it causes misleading feeling of insufficient articulation of their ideas and emotions. On the other hand males were affected less than females from these conditions. This study's findings support the previous researches' conclusions (Dündar & Kıyıcı, 2004; Yates, 1997). Moreover, consistent with the results of the study of Im and Lee (2004), females used the EC more, whereas they used the ST and JU less, and they prefer the II more. In fact, this case decreases females' discussion performances and interactions due to existing self-imposed boring and unreliable environment for the online discussion forum.

Interestingly, the wait time of the females after the message was sent was lower than that of the males. It might have caused a decrease in the cognitive level of the messages even though they could send rich and high level messages, because they did not sufficiently use the favorite characteristic of the "asynchrony" in the online discussion forum. Their reflection remained poor. Therefore, it would be a good idea if, a moderator or an instructor of the course should encourage and motivate students, especially, female ones that they should not be panic and that they should consider their knowledge and investigations about discussion topic in detail while sending messages.

## REFERENCES

Altun, A. (2005, January). Toward an effective integration of technology: Message boards for strengthening communication, *The Turkish Online Journal of Educational Technology*, *4*, Article 009. Retrieved December 12, 2005, from http://www.tojet.net/articles/419.htm.

Barett, E., & Lally, E. (1999). Gender differences in an online environment, *Journal of Computer Assisted Learning, 15,* 48-60.

Bates, A. W. (1995). *Technology, open learning and distance education*. London: Routledge.

Cappozoli, M., McSweeney, L., & Sinha, D. (1999). Beyond kappa: A review of interrater agreement measures, *The Canadian Journal of Statistics, 27*, 3-23.

Dündar, M.Ş., & Kıyıcı, G. (2004, July). Enstrümental analiz dersinde internet destekli öğretim uygulanmalı mıdır? *The Turkish Online Journal of Educational Technology, 3,* Article 0016. Retrieved December 12, 2005, from http://www.tojet.net/articles/3316.htm.

Garrison, D. R. (1992). Critical thinking and self-directed learning in adult education: An analysis of responsibility and control issues, *Adult Education Quarterly, 42*,136-148.

Garrison, D. R., Anderson T., & Archer, W. (2001). Critical thinking, cognitive presence and computer conferencing in distance education, *American Journal of Distance Education, 15*, 7-23.

Garrison, D. R., & Anderson, T. (2003). E-*learning in the 21st century. A framework for research and practice.* London and New York: Routledge Falmer.

Gunawardena, C. N., Lowe, C. A., & Anderson, T. A. (1997). Analysis of a global online debate and the development of an interaction analysis model for examining social construction of knowledge in computer conferencing, *Journal of Educational Computing Research, 17* , 97- 431.

Guzetti, B., & Fey, M. (2001, February). Critical perceptive on teacher research: Gender and post typographic text, *Reading Online*, *4,* Article 003. Retrieved November 24, 2005 from http://www.readingonline.org/newliteracies/lit_index.asp?HREF=/newliteracies/guzzetti/index.html.

Harasim, L. (1993). *Global networks: Computers and international communication*. Cambridge: MIT Press.

Henri, F. (1992). Computer conferencing and content analysis. In  A. R. Kaye (Eds), *Collaborative leaning through computer conferencing* (pp. 115 - 136). New York: Springer.

Herring, S. (2001). Computer-mediated discourse. In  D. S. Tahnen & H.E. Hamilton (Eds). *Handbook of discourse analysis* (pp. 612-634). Madlen: Blackwell.

Im, Y., & Lee, O. (2004). Pedagogical implications of online discussion for pre-service teacher training, *Journal of Research on Technology in Education, 36*,155-170.

Isman, A. (2002, October). Sakarya ili öğretmenlerinin eğitim teknolojileri yönündeki yeterlilikleri, *The Turkish Online Journal of Educational Technology, 1* , Article 0010. Retrieved December 12, 2005,  from http://www.tojet.net/articles/1110.htm.

Jonassen, D. H. (2000). *Computers as mindtools for schools*. Upper Saddle: Prentice Hall.

McDonald, J. (2002, August). Is a good as face-to-face as good as it gets? *Journal of Asynchronous Learning Networks, 6*, Article 002. Retrieved July 4, 2004, from http://www.sloan-c.org/publications/jaln/v6n2/v6n2_macdonald.asp

Newmann, D. R., Webb, B., & Cochrane, C. (1995). *A content analysis method to measure critical thinking in face-to-face and computer supported group learning*. Retrieved December 12, 2005, from Queen's University, Information Management Department Web site: http://www.qub.ac.uk/mgt/papers/methods/contpap.html

Palloff, R. M., & Pratt, K. (2003). *The virtual student*. San Francisco: Jossey-Bass, A Wiley Imprint.

Sproull, L., & Keisler, S. (1991). *Connections: New ways of working in the networked organizations*. Cambridge: MIT Press.

Tam, M. (2000, April). Constructivism, instructional design, and technology: Implications for transforming distance education. *Educational Technology and Society, 3*, Article 003. Retrieved May 15, 2002, from http://www.ifets.info/journals/3_2/tam.html.

Thomas, M. J. W. (2002). Learning within incoherent structures: The space of online discussion forums. *Journal of Computer Assisted Learning, 18*, 351-366.

Topcu, A. (2005). Content Analysis of an Online Discussion Forum: A Case Study, In *V. International Educational Technology Symposium, Vol 1* (pp 159-163). Sakarya:  Sakarya University.

Topcu, A., & Ubuz, B. (2004). The effect of the metacognitive abilities on the discussion performance in a constructivist "Science and Math Teaching Method" online course. In *IV. International Educational Technology Symposium, Vol 2* (pp 1096-1101). Sakarya: Sakarya University.

Yates, S. J. (1997). Gender, identity and CMC, *Journal of Computer-Assisted Learning, 13,* 281-290.