Denise E. Agosto, Assistant Professor, College of Information Science and Technology, Drexel University

This paper discusses the results of a Douglass Project for Rutgers Women in Math, Science, and Engineering research grant titled "Leading Young Women to the Sciences and Technology," founded by the Toyota USA Foundation. The project resulted in the creation of the Gender-Based Web Site Evaluation Model for selecting Web sites of high interest to young women. The model includes eight evaluation criteria related to gender: social connectivity, flexibility and motility, contextuality, personal identification, graphic and multimedia concentration, collaboration, inclusion, and confidence. To develop this model, the project investigator analyzed related literatures, created a working model, tested the working model using group interviews with adolescent females, analyzed the group interview transcripts using iterative pattern coding for qualitative data (Miles and Huberman 1994), presented the working model and data analysis results to an expert panel, and subsequently created a revised model. The revised model and a list of questions to assist adult intermediaries in selecting Web sites for young women are presented and discussed.

For many years now, women have held a minority of the high-status, high-salary jobs in computer- and technology-related fields (Comber et al. 1997; DeRemer 1989; Dorman 1998, Gorriz and Medina 2000). Various factors account for women's underrepresentation in these

to the Sciences and Technology" sought to develop institutes, materials, and other methods for encouraging adolescent women to enter computer, science, and technology fields.

Part II of this project sought to work toward redressing the lack of youth-centered computer use studies. This paper discusses the second part of the grant work, for which the project investigator conducted all of the research, including the analysis of related research, the creation of the model proposed in this paper, collection of data through group interviews, analysis of the data, and presentation of the research findings to an expert panel. The final project report for this research, as well as links to numerous Web sites that typify the various criteria in the Gender-Based Web Site Evaluation Model, can be found on the Girltech Web site.

Literature Review and Analysis

A sizeable body of research has examined the relationship between gender or sex and the use of technology.[1]

Personal Identification

component of the test site HurricaneHunter.com was the "cyberflight," which takes the user along on a flight into the center of a hurricane through text, photographs, and video clips. The participants found the flight to be dull and would have much preferred it had it enabled some form of contact with live humans:

> Participant 1: "It would be good if you could play [the cyberflight] against other people, that are online." [3]
>
> Participant 2: "Yeah."
>
> Participant 3: "Yeah, like if you go to the Jeopardy Web site, and if you register you can play against other people."

All of the study participants in the particular interview excerpted above became extremely excited at the prospect of playing a Web-based game against live people. Their interest in game playing was more as a method of making human contact than for the purpose of winning games.

Participant 1: “It’d be more interesting.”

After this last comment, the other young women in the group interview became excited at the prospect of reading an online biography of someone they actually knew, serving as strong proof of their preference toward sites with personal connectivity.

Graphic and Multimedia Concentration

Data from the group interviews indicated that to many of the participants, graphic and multimedia concentration was the single most significant factor in their rating a Web site

Other participants mentioned that the test site Doctors Over Time showed sex roles changing, with a male doctor in 1900 and a female doctor in 1998. Some found this feminist attribute to be exciting and empowering. For example:

> Participant 1: "There's one point that I really liked. In the past they had a male doctor with a female assistant, and in the most recent date they had female" doctor.
>
> Participant 2: "Yeah."
>
> Participant 1: "That was a good part that I really liked."
>
> Participant 3: "That was really good. A male doctor and a female doctor."
>
> Participant 4: "It shows how far women have come over time"
>
> Participant 1: "We're overtaking—[laughs]"
>
> Participant 4: "Before you would never think of a woman doctor. Only assistants or nurses, and now women can be whoever they want. They can be doctors, whatever."

Other participants were less enthusiastic about this feminist aspect of the site. They found the Doctors over Time sex-role change to be interesting but not particularly significant. As one young woman explained: "If [the site] has something to do with gender, like role changes, yeah, I can understand if they actually depict that. Otherwise, it doesn't really matter to me." Others felt that the sex-role change was "nice" but "not too important." Due to this mixed level of support, inclusion is a secondary evaluation criterion in the model.

Despite the participants' limited interest in inclusion, it is an important evaluation criterion for adult intermediaries to consider when selecting Web sites for young women. It is important to find inclusive resources for prescriptive reasons, since such resources can bolster young women's feeliseh an ie.77 [(D)4(d2(a)4(|)2(om)-10(ee|))-1(t)110(el( )]TJ)-6(i)-6(s7c69-)Tj 0.33 0 Td [(r)

from the Rutgers computer science department, two professors from the Rutgers School of Communication, Information and Library Studies, two regional directors of educational technology for New Jersey secondary schools, the director and assistant director of the Douglass Project, and two program directors from the Girls Scouts of the USA national headquarters. Each panel member had expertise in technology issues as well as experience in working with juvenile computer users

The panel offered overwhelmingly positive feedback for the working model, indicating that all seven criteria conformed with their own observations of young women's digital information preferences. They also suggested that an additional evaluation criterion could be added to the model. The panel members felt that one of the main reasons that young women rarely consider computer-related careers is that they lack self-confidence in their computer abilities, whether or not they lack related competence. Adding confidence to the model, they argued, would help adult intermediaries to locate Web sites that could work to combat this gender-related disincentive.

Subsequent reanalysis of the literature lent further support to confidence as a gender-based Web site–evaluation criterion. From her interviews with highly educated, intelligent women who were reluctant to use computers, Turkle (1988) concluded that "The central issue for these competent and talented women is not phobia or lack of ability, but a reticence to become more deeply involved with an object experienced as threatening" (46).

Similarly, Opie (1998) traced girls' reduced levels of confidence with computers to their lesser developed technological skills. Comber et al. (1997) traced these reduced levels of computer confidence to adolescent women's less frequent use of computer games, the majority of which are designed for and marketed to males. Based on the literature, it seemed that Web sites that offer strong encouragement and support could indeed be used to help counteract this gender-related self-doubt.

In contrast, reanalysis of the group-interview data indicated that the participants were relatively indifferent to confidence as a Web site–evaluation criterion. Participants in only one of the four group interviews discussed any related ideas in the following short conversation concerning the Women of NASA site:

> Participant 1: ["I liked] the teen-friendly vocabulary."
>
> Participant 2: "Oh, that's right."
>
> Participant 3: "They had good language."
>
> Participant 2: "That's right."
>
> Participant 3: "Understanding of us."

The Revised Model

In accordance with the panel's suggestion, the project investigator revised the working model to include confidence. Even though data reanalysis indicated that the participants expressed minimal interest in Web sites with strong confidence, confidence was added to the model as an

‘sweeping generalizations,’ the ability to determine what girls want may seem necessary at a time when we are trying to open up space for girls to participate within this medium at all” (25). Therefore the use of the model in selecting Web sites will result selections likely to appeal to most, but not all, young females.

Not only do women continue to represent a minority of the high-salary, high-status computer-related fields, research indicates that fewer and fewer young women are completing bachelor’s degrees in computer science (Gorriz and Medina 2000). One method of combating this trend is for library media specialists, teachers, and other adult intermediaries to select digital information resources using the model and evaluation questions proposed in this paper.

Of course, the selection of digital resources with increased appeal to young women is only one way of motivating girls and technology fields more appealing career options for young females. The selection of such resources can help to ease the science and technology gender gap, but it cannot completely eliminate it. Other methods of increasing young females’ interest in technology are also important, such as working to ensure that female and male youth use technology at equal rates at school and at home. *Gender Gaps: Where Schools Still Fail Our Children* (American Association of University Women 1999) warned that females are not participating in computer science education and are not as equal to males. The study stated that in 1995 and 1996, for example, females comprised just 16% of the advanced placement computer science test takers. Teacher and higher education must encourage female students to take computer science courses at rates equal to male student participation rates.

It is also important for adult intermediaries to observe and guide young people in their use of technology. In the school library media center, media specialists are in an ideal position for observing gender differences in student computer use. In cases in which media specialists can seek to equalize computer utilization by testing different use patterns until a successful [illegible] is found. Possible use patterns include dividing class periods in half into “females’ time” and “males’ time” for the computers, and pairing females with females and males with males at computers, instead of using mixed-gender groups, in which males often dominate computer use. No single-use pattern is right for all student groups; experimentation with these and other patterns is necessary to find the optimal pattern for any particular student group or mixed-sex set.

It is hoped that, through methods such as those suggested in this paper and through the Web site evaluation questions offered in this paper, young women will gain valuable computer skills and increased self-confidence in their computer abilities, helping them to view themselves as potential computer scientists and engineers in our ever more [illegible] New Jersey.

2. It is important to differentiate between the terms “sex” and “gender.” “Sex” is

based characteristics of interaction with electronic information. But, in view of the fact that more girls and young women exhibit feminine traits than do boys and young men, identification of gender-based, information-interaction characteristics can lead to the design of electronic information resources that are generally more interesting, user friendly, and enjoyable to young women and girls than are the majority of existing electronic information resources, which have traditionally been designed for and marketed to boys and young men.

3. All transcript quotes arercrion 6(or)2(hi)-2(o6Tf yr)-1130rle-5(ar-2(e)lar)-iw 1.5 Tc 0 Tw -19.-6(

Rrs 123r329.13 Drd (or)meir(i),rM4(s). 1989. T 0 rrC(rd) 12(p(g)10u(e)-6)3(ir(-160(y)20r)3(m)((e)-6)4(t)-sn)-1ce

/M 194.54 hic02(e)4D6(166)Tj 20<</MCID 635.83 P -15..15 -261.58 e02 Tc6 P -1 dror-3r

Gorriz, C. M. and C. Medina. 2000. Engaging girls with computers through software games. Communications of the ACM 43: 42–49.

Gross, M. 1999. Imposed queries in the school library media center: A descriptive study. Libr and Information Science Research 21(4): 501–521.

Gross, M. 1997. Pilot study on the prevalence of imposed queries in a school library media center. School Library Media Quarterly 25: 157–166.

Harding, S. G. 1991. Whose science? Whose knowledge? Thinking from women's lives. Ithaca, N.Y.: Cornell University.

Honey, M., B. Moeller, C. Brunner, D. Bennett, P. Clements, and J. Hawkins. 1991. Girls and design: Exploring the question of technological imagination. Center for Technology in Education Technical Report No. 17, 1–12.

Kafai, Y. and M. J. Bates. 1997. Internet web searching instruction in the elementary classroom: Building a foundation for information literacy. School Library Media Quarterly 25: 103–111.

Lage, M. J. and M. Treglia. 1998. Gender and individual learning. In Teaching economics to undergraduates: Alternatives to chalk and talk, ed. W. E. Becker and M. Watts. Cheltenham, U.K.: Edward Elgar, 354–80.

Laurel, B. 1990. Introduction. In The art of human-computer interface design, ed. B. Laurel. Reading, Mass.: Addison Wesley, 1–12.

Scaife, J. 1998. Science education for all? Towards more equitable science education. In Gender in the secondary curriculum: Balancing the books, ed. A. Clark and E. Millard. London: Routledge, 60–79.

Schofield, J. W. 1995. Computers and classroom culture. New York: Cambridge.

Seidman, I. E. 1991. Interviewing as qualitative research. New York: Columbia Teachers College.

Seymour, E. and N. M. Hewitt. 1997. Talking about leaving: Why undergraduates leave the sciences. Boulder, Colo.: Westview.

Subrahmanyam, K. and P. M. Greenfield. 1998. Computer games for girls: What makes them play? In From Barbie to Mortal Kombat: Gender and computer games, ed. J. Cassell and H. Jenkins. Cambridge, Mass.: MIT, 46–71.

Turkle, S. 1988. Computational reticence: Why women fear the intimate machine. In Technology and women's voices: Keeping in touch, ed. C. Kramarae. New York: Routledge, 41–61.

Walford, G. 1981. Do chemistry textbooks present a biased image? Education in Chemistry 18, no. 1: 1.

Wester, F. 1996. The analysis of qualitative interviews. In The deliberate dialogue, ed. I. Maso and F. Wester. Brussels: VUB University Pr.

Wolcott, M. S. 1998. Information seeking and the world wide web: A qualitative study of seventh grade students' search behavior during an inquiry activity. Unpublished Ph.d. diss., University of San Francisco.

Appendix

Social Connectivity

1. Does the resource emphasize the importance of its topic matter to human relationships?

2. Is there a method for contacting other people, such as a chat room for speaking to experts or an email address for obtaining further information?

3. Does the Web site enable live interaction with other users in different locations?

Flexibility and Motility

1. Do questions and problems in the site have multiple correct answers?

2. Does the Web site allow users to select from numerous navigational paths?

3. Does it allow users to rearrange the physical placement of objects on the screen?

4. Does it encourage and reward multiple-use styles, as opposed to extinction penalties for selecting incorrect choices or paths?

5. Does the Web site support fluidity and exploration?

Contextuality

1. Are information contexts (histories, stories, explanations, backgrounds, etc.) emphasized?

2. Is information presented in story format, as opposed to isolated facts, figures, charts, and graphs?

3. Does the Web site encourage contemplation and interpretation?

Personal Identification

1. Is it likely that most young women would find a connection between their personal lives and the context of the Web site?

2. Does the site encourage role-playing?

Graphic and Multimedia Concentration

1. Is there a relatively high percentage of graphic and multimedia content throughout the various parts of the site?

2. Are the graphics clear and easy to understand?

3. Are the audio and video components high quality?

Collaboration

1. Does the Web site encourage exploration and inductive learning rather than emphasizing competition and winning (for imposed query use)?

2. Does it lend itself easily to small-group use (for imposed query use)?

Inclusion

1. Are women and men represented in roughly equal numbers in narrative, graphic, audio, and video content?

2. Are people of diverse racial and ethnic backgrounds depicted?

3. When women and members of marginalized groups are represented, are they presented in positions of respect and influence?

Confidence

1. Does the site use a tone of respect in regard to users' abilities instead of presenting itself as exclusively authoritative?

2. Does it encourage learning rather than implying that the user should already be proficient in the subject matter?

3. Above all, does the site support and nurture young women's confidence in themselves and in their abilities?

School Library Media Research (ISSN: 1523-4320) is the successor to School Library Media Quarterly Online and the predecessor to School Library Research, an official journal of the American Association of School Librarians. The purpose of School Library Media Research is to promote and publish high quality origi