Identifying Effective Factors for Women Participation in Technology: A Database Model

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Abstract

This paper is a continuance of a paper presented at the ISECON 2001 Conference addressing the issue of how our young women are not only falling through the cracks of the information superhighway, but are not even interested in the technology field, published in April of 2000 by the American Association of University Women (AAUW). In June 2002, the National Coalition for Women and Girls in Education published a report on gender equity in technology and issued a D+ to our nation's schools.

After two years of creating programs that offer different strategies to attract more females to the technology field, the factors that contribute to this phenomenon have been identified. Studies have found that there is a lack of mentorship at the high school level, because girls are again facing decade-old stereotypical biases. Girls want careers in which they can "make a difference". Girls have little or no knowledge about IT careers.

The research information has been organized into a database model as a base for future studies investigating the continued phenomenon of gender inequality in the technology field. This model has identified the major entity or category groups, normalized the data into a database model using current relational database methodology. The result presented in the paper defines a physical database structure that will incorporate existing information that will add to the "body of knowledge" of contribution factors of the gender inequity in the field of technology.

Keywords: women, technology, computing, computer reticent, mentorship programs, glass ceiling

1. INTRODUCTION

This paper is a continuance of a paper presented at the ISECON 2001 Conference addressing the issue of how our young women are not only falling through the cracks of the information superhighway, but are not even interested in the technology field, published in April of 2000 by the American Association of University Women (AAUW).

From an historical perspective, this paper will address three major groups that have been instrumental in contributing to the "body of knowledge" for technology research and education by gender:

- American association for University Women
- National Coalition for Women and Girls in Education
- National Council for Research on Women

2. AMERICAN ASSOCIATION OF UNIVERSITY WOMEN

In April of 2000 the American Association of University Women (AAUW) published a startling report about how our young women are not only falling through the cracks of the information superhighway, but are not even interested in the technology field. The worry has been that our girls are computer-phobic. What the Commission on Technology, Gender and Teacher Education discovered is that girls are computer reticent. The Executive Summary of the *TECH-SAVVY—Educating Girls in the New Computer Age* focused on key themes to investigate. These key themes were:

1. Girls have reservations about the computer culture—and with good reason.

2. Teachers in grads K-12 have concerns—and with good reason.

3. Statistics on girls' participation in the culture of computing are of increasing concern, from the point of view of education, economics and culture.

4. Girls' current ways of participating in the computer culture are a cause for concern (AAUW, pp. ix-x, 2000).

Girls in the focus groups explain that building human relationships is as intellectually complex and valuable as understanding machines; they question boys' absorption with computers as a substitute for social skills. As one high school student put it, "Women are into talking to each other and building these relationships, and guys—they are not as comfortable with themselves or with each other. They just like to build a relationship by putting it into the computer" (AAUW, p.9, 2000).

Girls want to make a difference within the social structure, rather than playing with machines. Girls are not making the connection that technology is integrated with all aspects of life—social, philosophical, financial, and cultural. By not making this connection, girls are missing the opportunity to fulfill their need to contribute to society by avoiding entrance into the technology field. After two years of creating programs that offer different strategies to attract more females to the technology field, the factors that contribute to this phenomenon have been identified. Studies have found that there is a lack of mentorship at the high school level. Girls want careers in which they can "make a difference". Girls have little or no knowledge about IT careers. Girls are facing decade-old stereotypical biases (AAUW, 2000).

3. NATIONAL COALITION FOR WOMEN AND GIRLS IN EDUCATION

In June 2002, the National Coalition for Women and Girls in Education (NCWGE) published a report on gender equity in technology and issued a D+ to our nation's schools. In this new millennium when technology and information are becoming a part of our daily lives, we are failing a major segment of our society, girls and women. (NCWGE, p. 51-53) This recent study has been based on the research following the passing of Title IX of the Education Amendments in 1972, whereby

"No Person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving federal financial assistance." (NCWGE, p.1)

Research completed at the 30 year anniversary of Title IX showed that areas of improvement include:

- Sexual harassment remains pervasive in public schools—81 percent of students surveyed have experienced it.
- Women receive only 20 percent of computer science and engineering-related technology bachelor's degrees.
- Fewer girls than boys enroll in computer science, feel self-confident with computers, and use computers outside the classroom.
- According to a 2000 study by the Department of Labor, nearly 75 percent of future jobs will require the use of computers, but less than 33 percent of participants in computer courses and related activities are girls.
- Although teenage girls use computers and the Internet at rates similar to their male peers, girls are five times less likely to consider a technology-related career path or plan on taking postsecondary technology classes.(NCWGE p. 2-53)

As a result of the 30th anniversary study, an Action Agenda was created to help facilitate change in order to move towards achieving "Title IX's goal of eliminating sex discrimination in education." (AAUW, p.59, 2000) The Action Agenda addressed policy changes, tasks for presidential and administrative agencies, and recommendations for education programs and activities.

4. NATIONAL COUNCIL FOR RESEARCH ON WOMEN

In 2001, The National Council for Research on Women (NCRW) published a study titled, *Balancing the Education: Where are Women and Girls in Science, Engineering and Technology* (NCRW, 2001). Linda G. Basch, Executive Director of NCRW prefaced the study by acknowledging the efforts of the past two years which witnessed heightened activism involving women and girls in science in science, engineering and technology. The key questions addressed were:, "Can we build on what we have learned over the past two decades to achieve these goals? Can we muster the research, strategic planning and support needed to make possible such major changes in the structure and culture of our institutions?" (NCRW, p.11, 2001)

The study, *Balancing the Education: Where are Women and Girls in Science, Engineering and Technology* (NCRW, 2001), addresses the strategies in place to change the underrepresentation of women and girls which would transform a culture that incorporates women and girls in science into the environment. Certain special events in the last decade took place changing the past struggle for women and girls from invisibility to possible culture incorporation.

- "In the spring of 2000, the international community gathered to assess the promises made in the plan of action passed five years before at the United Nations Fourth World Conference on Women held in Beijing. Issues concerning women and technology were put forth as essential parts of many of the goals outlined in the plan of action.

- The success of the Human Genome Project and other advances mark a leap in technology, particularly in biotechnology were women are poised to make significant contributions because of the relatively large number of women in the field.

- Critical national debates are joined today over such issues as affirmative action and funding for science and technology research; women have a great stake in these policy discussions" (NCRW, p.15,2001)

The conclusion of this study shows that there is awareness that women and girls in science, engineering and technology be included in the mainstream of leadership, education and policy making. Only continued programs and strategies supporting this effort will change the current exclusion of women and girls in our culture of science and technology. The importance of research becomes an integral part of the effort. (NCRW, p.19,2001)

This study, *Balancing the Equation*, provided much of the quantitative data and logical model for the various issues regarding women and girls in sciences, engineering and technology. (NCRW, p.11, 2001)

The research information has been organized into a database model as a base for future studies investigating the continued phenomenon of gender inequality in the technology field. This model has identified the major entity or category groups, normalized the data into a database model using current relational database methodology. The result presented in the paper defines a physical database structure that will incorporate existing information that will add to the "body of knowledge" of contribution factors of the gender inequity in the field of technology.

In designing the database model for the research information, a base for future studies investigating the continued phenomenon of gender inequality in the technology field was established. The logical model reflects an object-oriented methodology identifying the following class diagrams: student, skill, test, school, interview, course, section, is_registered, faculty. Refer to Appendix A, Table 1 and Table 2 for the class diagram associations and methods. This structure was identified to include all of the information needed to research two aspects of a student: the aspect of an enrolled student

and the aspect of a student preparing for a career or applying for higher education after graduation. The aspect of an enrolled student addresses a student taking courses by section, the faculty teaching the course, and the date of the semester. The aspect of a student preparing for a career or applying for higher education after graduation addresses the student with a skill set, pre-job tests, graduation tests, school applied, and the interview process for either graduate school or a career position. By creating this object-oriented class diagram, a foundation was established to gather data in order to track student information quantifying present and future trends.

5. CONCLUSION

With all of the progress made for women and girls in science, engineering and technology in the last decade, fairness and equity for women and girls remains a glaring issue. Further research on this topic is the only way to assure social awareness and support needed to change the culture. "Talent resides in all groups and genders. Therefore is one is really looking at a robust economy based on science and technology, and if you have a myriad of social and environmental problems that have to be addressed, you do not have anybody to waste" (NCRW, p.14, 2001).

6. REFERENCES

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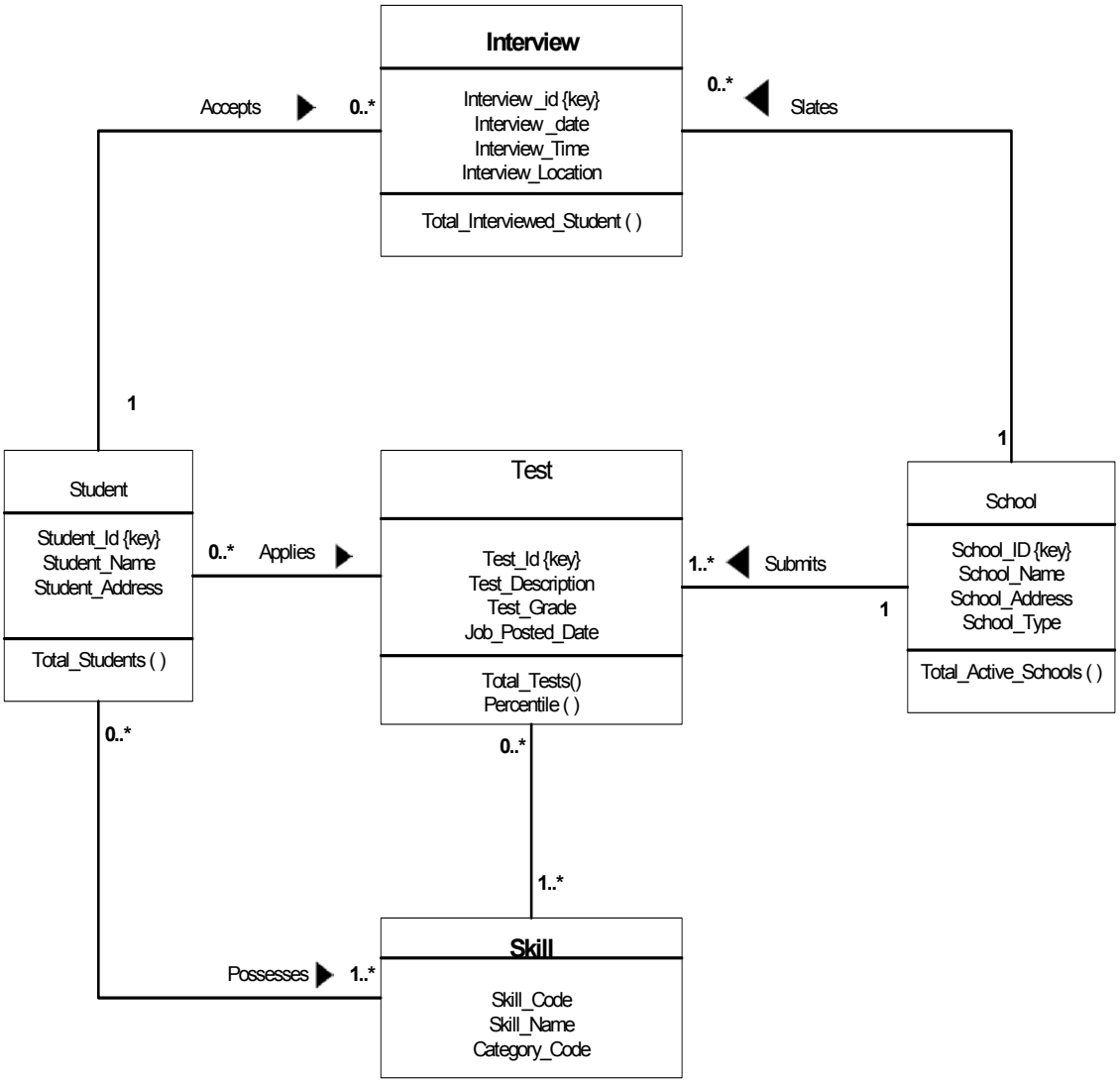
Appendix A
Table 1
The Database Perspective

Purdue University Calumet Research Study
Women and Girls in Technology
Class Diagram (Object Diagram)



Appendix A
Table 2
The Database Perspective

Purdue University Calumet Research Study
Women and Girls in Technology
Class Diagram (Object Diagram)