Assessment and Evaluation Discussion

DESIGN A WIE PROGRAM WITH THE RIGHT FOCUS

Michelle Schoenborn¹, W. Floyd Harris², Jennifer Videtto³

Abstract—The University of Missouri-Rolla (UMR) conducted a focus group study of enrolled undergraduate and graduate women in engineering students to assess their needs and levels of satisfaction with their college experiences at UMR. The university's Women in Engineering Program (WEP) is twenty-five years old, but has primarily served as a scholarship program. The purpose of this study was to learn more about women students' perceptions and ideas before developing a renewed WEP mission and strategic plan. This focus group study was patterned after a study conducted for the Minority Engineering Program at Virginia Polytechnic Institute and State University (VT). UMR's study included a random sample of students for eight separate focus groups of women consisting of freshmen through master's level students. In addition, one group of volunteers from UMR's student chapter of the Society of Women Engineers (SWE) was conducted. Of the university's total women in engineering population, 43 students, or 6% were interviewed. Each group discussion followed the same script of key questions to ensure: 1) continuity and to measure changes in perceptions by class level and 2) that the analysis would not be based on the moderator's personal view. Information from the focus group study was utilized to design a survey that was distributed to the entire women in engineering population. The quantitative data from the survey, the qualitative data collected from the focus groups, and input received from a committee of UMR alumni, faculty, and staff are being used by the WEP for program development. This paper will provide information on how the survey was coordinated, the process for analysis, the outcomes generated, the resources needed, and the implication and application to the WEP.

Index Terms—Design a WIE program, Focus Group Study, Outcomes and Implications of a WIE Study

Introduction and Background

The University of Missouri-Rolla's (UMR) Women in Engineering Program (WEP) was established in 1975. The WEP program was administered by the same staff that began the Minority Engineering Program a year earlier (1974). Like many of the WEPs at the time, considerable effort was placed on recruitment, fundraising for scholarship support, improvement of campus environment for female students, and professional development activities. However, due to a limited amount of human and financial resources, over time the WEP began to serve primarily as a scholarship program.

In the fall of 2000, the WEP celebrated its 25th anniversary. As part of that celebration, the WEP staff decided to take a closer look at where we've been, where we are now, where do we want to go, how do we get there, and how much will it cost.

To provide some background, the university's engineering enrollment makes up 76% of the campus' total enrollment, and has a reputation for its strong engineering programs and male-to-female ratio of 3 to 1. This ratio is unique in comparison to the other state universities which offer more comprehensive degree programs. Although the odds may seem to work against UMR's women students, their success rates actually prove the contrary.

In the fall of 2000, women in engineering students represented 19.7% (657) of UMR's engineering enrollment, as compared to the national average of 20% (1999-2000). According to reference [1], UMR ranked 37th in the number of women in engineering enrolled in 1999. In addition, UMR's women students received 30.1% of undergraduate degrees awarded in engineering at UMR, compared to the national average of 20.6%. UMR ranked 19th (133) in the number of B.S. degrees awarded to women [2]. To continue, the women in engineering students also maintain higher retention rates than the male engineering students at UMR, and confer that they are "more satisfied with their social experiences at UMR than male students.[3]"

While UMR's women in engineering students have made tremendous progress over the last 25 years, much still remains to be done!

Why Conduct a Focus Group Study?

Due to the national effort in preparing for the future demand of talented engineers and a steady decline in engineering enrollment at UMR, the Women in Engineering Program began to evaluate its role in addressing these issues. To assist the WEP program with reviving its mission and developing a strategic plan, a Corporate Development Council (CDC) was established in the winter 2000 semester consisted of a team of alumni in industry, faculty, students, and WEP staff. The CDC offered a great deal of expertise, personal experiences, and ideas to the WEP development.

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2. Target Population Groups: When selecting FG participants, it's important to balance the differences and commonalities of your members in order to elicit the synergy that makes focus groups so useful [6]. To encourage synergy and ensure that the WEP would receive insight at all stages of the WIE's college experiences, the FG team agreed to conduct eight focus group sessions including two groups in each of the following categories: freshmen, sophomores/juniors, graduating seniors, and students pursuing M.S. degrees. In addition, one focus group was conducted with student members of the Society of Women Engineers representing various class levels and disciplines. Because this was the WEP's first experience conducting focus groups, the team decided to experience the differences between conducting randomly and purposively selected focus groups (see “Things Learned” for details).

3. How to use the information: The information collected in the focus groups was intended to provide input to the Corporate Development Council to assist with defining the WEP mission and strategic plan. In addition, the information was utilized to design a survey that was distributed to the entire WIE population, including the 43 FG participants. The quantitative data from the survey, qualitative data from the focus groups, and recommendations from the CDC are being used by the WEP staff to design and implement programs according to the university's WIE students' needs and suggestions.

4. Timeframe: The FG team selected the month of September 2000 to conduct all nine focus group sessions. The basis for selecting this month was threefold: to accommodate the students' college schedules (didn't conflict with welcome back to school activities, mid-terms or finals, etc.); to provide time for first-time freshmen and transfer students to get acclimated to the campus; and to allow time after the focus group sessions to prepare a summary analysis before the first campus held CDC meeting on October 6, 2000. This date allowed the FG team six weeks to coordinate, complete, and analyze the focus group sessions.

5. Script: A focus group script consists of three parts: the opening, key, and closing questions. The questions should be presented in an open-ended fashion to encourage individualistic and unbiased responses [8]. As part of the workshop agenda, the FG team participated in a two-hour brainstorming session to identify and list all of the questions applicable to our FG purpose. The questions were then categorized into key issues, refined, and put in sequential order. The same script was used for each FG discussion to ensure: 1) continuity and to measure changes in perceptions by class level and 2) that the analysis would not be based on assumption or the moderator’s personal view (see appendix A).

A handout was included, in the final key question (#6), listing 19 potential WIE services that were selected in accordance to services offered by Women in Engineering Programs at UMR’s comparison schools (see appendix B). The handout was essential in focusing on the services of

Steps to Coordinating the Focus Group Study
Planning Stage

In August 2000, the WEP invited Dr. Eileen Van Aken, focus group study coordinator for the Minority Engineering Program at VT, and Paige Smith, graduate student in Industrial Engineering and MEP graduate assistant at VT, to the UMR campus to serve as consultants during the planning stage of coordinating a FG study. Under the guidance of Aken and Smith, the WEP focus group team participated in a five hour training workshop to decide the purpose and boundaries, identify the target population groups, determine how the FG information will be used, and to create the timeframe, script, and strategy for recruiting FG participants. The team included the WEP Director and Asst. Director, FG Study Coordinator and three moderators. The moderators selected were university staff members who had previous experience in conducting focus groups with college students.

1. Purpose and Boundaries: The purpose statement for a focus group answers the question, “What do we want to achieve by gathering data using a focus group?[6]” The team was initially challenged with restricting the purpose of the study due to the reciprocal nature of recruitment and retention factors. However, it was agreed that the WEP must first learn to what level WIE students are satisfied with their educational experiences at UMR; recognizing that the same information would also be beneficial to the WEP when preparing a recruitment plan. Therefore the focus groups involved only currently enrolled WIE students.

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most importance to the WIE students (see appendix C). After the top services were identified, the focus group moderator was able to ask questions clarifying the WIE students’ decisions and descriptions of those services.

6. Strategies for recruiting participants: In order to keep the WEP study unbiased, the FG team chose to randomly select 12 WIE students from each targeted group. To provide incentive, a total of 96 WIE students received a personal invitation via mail and email from the Chancellor announcing the WEP program’s effort and requesting their participation in a FG session and light dinner. As a follow up to the invitation, the WEP sent an email message reminding the participants to confirm their attendance before the deadline. Then to ensure an accurate number in attendance, phone calls were made to each participant the day before the focus group session serving as another reminder of what, when, and where!

To recruit the group of volunteers from UMR’s student chapter of the Society of Women Engineers, a personal invitation was given during a regularly scheduled meeting.

7. How to capture data: Information was captured using three separate methods during each FG: the moderator listed key themes and ideas on a flip chart, a graduate student transcribed by hand exact comments made, and an audio recorder was used to document the entire conversation.

Execution Stage

- **Schedule focus groups**: The focus group sessions were scheduled on Tuesdays and Wednesdays throughout the month of September, from 5:00 – 7:00 p.m. to accommodate students’ class schedules (e.g. MWF, TR).
- **Arrange Logistics**: The WEP office arranged for on-campus room and equipment reservations, dinner, etc.
- **Send out invitations**: The WEP office mailed and emailed the invitations two weeks in advance directly to the participants.
- **Conduct focus groups**: Nine FG discussions were conducted during September with a total of 43 or 6% of the university’s women in engineering students.

Analysis Stage

Immediately after information was captured from the focus group discussions, the moderator and transcriber discussed the main themes and key points conferred by the participants, and a summary of each focus group discussion was created. At the completion of the entire FG study, a comprehensive summary was created for the WEP Corporate Development Council providing a general overview of the trends and surprises generated from the participants. In order to pinpoint the key attitudes and perceptions expressed by all targeted groups, the focus group coordinator categorized the comments generated from each key question and created an overview of the participants’ significant areas of interest or concern. To learn the differences in perceptions between the four targeted categories (freshman, sophomore/juniors, graduating seniors, and students pursuing M.S. degrees), the same process was applied, comparing changes or similarities in attitudes between the various class levels. Appendix D includes the summary overview presented to the CDC (in bullets) with the categorical summary listed in tables.

Recognizing the risk in using the focus group data to generalize to the entire WIE population [5], a survey was then designed in accordance with the FG summaries, and distributed to the entire WIE population, including the FG participants. The survey was developed in parallel to the FG key questions, but will provide a detailed quantitative analysis of the WIE populations needs and perceptions.

Outcomes and Implications to the WEP

The focus group discussions provided greater insight to the level WIE students are satisfied with their educational experiences at UMR. Prior to the actual study, the WEP staff shared with each other what they suspected UMR’s WIE students’ needs and desires would be. While some of those predetermined thoughts were affirmed, others were not! The following are examples of the staff’s comments and how the FG helped to address them:

- WIE students would benefit from mentoring (true, but especially at the junior through masters levels)
- WIE students would desire larger dollar scholarships (not necessarily; actually prefer renewable low dollar scholarships)
- WIE need a female basic engineering class (prefer not to be segregated, but freshmen would like power tool preparation)
- It appears the WEP should focus more on recruitment (true, but the WEP also enjoy being in the minority)
- WIE students need better college preparation (true)
- WIE students may feel threatened in the classrooms by male faculty (typically not; the quality of instructor was more important than gender)
- WIE students would enjoy a chat room to converse with a female role model (definitely not; it’s scary and too time consuming)

When assessing the satisfaction levels of WIE students, opinions ranged from very high levels to low levels as conveyed in the FG discussions (refer to Appendix D). However, as reflected in the freshmen survey results and WIE graduation rates, the students overall opinion of their experiences at UMR was fairly high. This response is attributed to the size of the student body and campus, the personal attention received from faculty, the quality of
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• summaries immediately following the session while the comments are still fresh in your mind.
• While the randomly selected FG sessions revealed one targeted group’s perceptions, the purposively selected group of volunteers were more cohesive and therefore generated a more dynamic discussion.
• A similar study should be conducted every two years to stay abreast of your students’ needs as they may change with time.

Future Plans

• Analyze and formulate data from the WEP survey to share with the CDC and university.
• Continue to collaborate with the CDC to develop a strategic plan and mission for the WEP.
• Identify necessary resources to implement plan.
• Potentially plan for future assessments of new targeted groups such as high school women, alumni, Ph.D candidates, etc.

Acknowledgment

The Women in Engineering Program staff would like to acknowledge and express their appreciation for the training and expertise shared by Dr. Bevlee Watford, Dr. Eileen Van Aken, and Paige Smith, colleagues from Virginia Tech.

References


[3] University of Missouri-Rolla, Local Student Opinion Survey, 1999


Author Information

MICHELLE SCHOENBORN
Michelle has worked at the University of Missouri-Rolla for approximately seven years. For the past three years, she has worked with UMR’s minority and women in engineering programs, coordinating various student activities and programs. She is currently pursuing a B.A. in Business Administration with emphasis in Marketing and Management. Due to her interest in marketing and expanding UMR’s Women in Engineering program, she has coordinated the WEP focus group study.

FLOYD HARRIS
Floyd has directed the University of Missouri-Rolla’s Minority and Women in Engineering Programs for over 26 years. He has a B.S. degree in Psychology from UMR and a MBA from Drury College. Floyd has been active in several professional organizations including NAMEPA of which he received the 1995 National Director of the Year award. He currently serves as an advisor for the Region 5 National Society of black Engineers and is active in community organizations, both locally and at the state level.

JENNIFER VIDETTO
Jennifer Videtto is the Assistant Director of the Minority Engineering Program at the University of Missouri-Rolla. She came to UMR with 15 years teaching experience at the University of Texas, Tyler campus, where she taught Operations Management courses and also was the Coordinator of Advising for the College of Business. She has a B.S. degree in Industrial Engineering from West Virginia University and an MBA from the University of Louisville.

Appendix A—Focus Group Script

Opening Question:
• Tell me your name and the one thing you like best about being at UMR (or why did you pursue Engineering)?

Transition Question:
• Do you feel that your high school prepared you for college? If so, why? If not, why not?

Key Questions:
  1. Why did you come to UMR?

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2. What’s the most important thing for you to gain from your college experience?

3. What barriers have you encountered?

4. How would exposure to role models that are like you enhance your educational experience/learning?

5. If you were to design a program for women engineers, how would you describe it? What components would it have?

6. If WEP were to offer the services listed on this handout, rank the top three services of most importance to you (1 = highest and 3 = lowest). Then put an X by the three services of least importance to you (see appendixes B and C).

Ending Question:
• If you were chancellor, what one thing would you do to improve the educational experience for women on this campus?

Appendix B – Handout

1. Female Basic Engineering Class
2. One week Introduction to Engineering Summer Program for High school juniors and seniors
3. Mentoring (with Alumni, Faculty, or Upperclassmen)
4. Personal Development Workshops (sexual harassment, leadership, career, etc.)
5. Advising/Counseling
6. Website
7. Increase scholarship program
8. Social Activities
9. Opportunities for community service
10. Pre-Collegiate programs
11. Academic Recognition banquet
12. Women’s design competitions
13. WEP tutoring program
14. Luncheon for new students
15. Evening with Industry Banquet
16. WEP list-serve
17. WEP weekly chat room
18. WEP study room
19. Summer bridge program for women (transition program from High School to College)
Appendix C – Handout Analysis

<table>
<thead>
<tr>
<th>SERVICE</th>
<th>Total</th>
<th>Favorable</th>
<th>Least</th>
<th>Rankings</th>
<th>Desired</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1's</td>
<td>2's</td>
<td>3's</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female Basic Engr. Class</td>
<td>2</td>
<td>1</td>
<td>27</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>One Week Female Intro</td>
<td>3</td>
<td>4</td>
<td>2</td>
<td>7</td>
<td>X</td>
</tr>
<tr>
<td>Mentoring</td>
<td>10</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>X</td>
</tr>
<tr>
<td>Personal Devl. Workshops</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td>Advising/Counseling</td>
<td>9</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>X</td>
</tr>
<tr>
<td>Website</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase Scholarships</td>
<td>2</td>
<td>8</td>
<td>4</td>
<td>0</td>
<td>X</td>
</tr>
<tr>
<td>Social Activities</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>0</td>
<td>X</td>
</tr>
<tr>
<td>Opp. For Community Service</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td>Pre-Collegiate Programs</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>X</td>
</tr>
<tr>
<td>Academic Recognition Banq.</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Women’s Design Competition</td>
<td>1</td>
<td>2</td>
<td>15</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>WEP tutoring program</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>X</td>
</tr>
<tr>
<td>Luncheon for new students</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evening with Industry Banq.</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>WEP list-serve</td>
<td>1</td>
<td>6</td>
<td>5</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>WEP weekly chat room</td>
<td>1</td>
<td>1</td>
<td>23</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>WEP study room</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>X</td>
</tr>
<tr>
<td>Summer bridge program</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>8</td>
<td>X</td>
</tr>
</tbody>
</table>

TOP THREE SERVICES: Mentoring, Advising/Counseling, Increase Scholarships

Appendix D—Focus Group Summaries

Nine Focus Groups Conducted Groups Total Attendance
Freshmen 2 8
Sophomores/Juniors 2 10
Seniors 2 8
Masters (graduate) level 2 11
SWE (various class representation) 1 6
TOTAL PARTICIPANTS: 43

What one thing do you like best about being at UMR?
- SIZE: Close-Knit campus community and peaceful atmosphere

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Sophomore/Junior</th>
<th>Graduating Seniors</th>
<th>M.S. candidates</th>
<th>SWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedom</td>
<td>Atmosphere – small enough to receive attention</td>
<td>Reputation: job security when graduate</td>
<td>Academic setting</td>
<td>Close-knit academic community</td>
</tr>
</tbody>
</table>

Do you feel that your high school prepared you for college?
- Majority of responses resulted in “NO.”
  - Lack of study skills
  - Weak curriculum or lack of math and science courses
  - Weak college advising

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Sophomore/Junior</th>
<th>Graduating Seniors</th>
<th>M.S. candidates</th>
<th>SWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>No – weak academic standards</td>
<td>No – not socially or academically prepared</td>
<td>No – weak standards and weak counseling</td>
<td>No – counselors didn’t push engineering to girls</td>
<td>No – not socially or academically prepared</td>
</tr>
</tbody>
</table>

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Why did you come to UMR?
- #1 Word of Mouth - Reputation
- #2 Most for your money

<table>
<thead>
<tr>
<th>Freshman</th>
<th>Sophomore/Junior</th>
<th>Graduating Seniors</th>
<th>M.S. candidates</th>
<th>SWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liked math and science and word of mouth</td>
<td>Family ties to university and cost</td>
<td>Reputation and cost</td>
<td>Word of mouth and cost</td>
<td>Word of mouth and cost</td>
</tr>
</tbody>
</table>

What is the most important thing for you to gain from your college experience?
- Independence and ability to be successful

<table>
<thead>
<tr>
<th>Freshman</th>
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<th>Graduating Seniors</th>
<th>M.S. candidates</th>
<th>SWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Be self-sufficient</td>
<td>Real world practical skills</td>
<td>Be knowledgeable and independent</td>
<td>Ability to achieve</td>
<td>Be well-rounded and confident in abilities</td>
</tr>
</tbody>
</table>

What barriers have you encountered?
- Ratio of females/males
  - See it as “a factor but not a barrier”
- Social atmosphere and rural community
  - “nothing to do here”

<table>
<thead>
<tr>
<th>Freshman</th>
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<th>M.S. candidates</th>
<th>SWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of mechanical experience</td>
<td>Ratio is a factor, but not a barrier (lack of study buddies) – unawareness of what’s available socially</td>
<td>Ratio (have to prove yourself against guys; don’t need my hand held); Rolla – nothing to do here</td>
<td>Lack of women creates social challenges; feel left out of technical projects because of gender</td>
<td>Few female professors isn’t a barrier, but it would be nice to have more.</td>
</tr>
</tbody>
</table>

Note: Overall the WIE students felt there were no barriers; however, they do face challenges. It was stated that “they only make us want to rise up to the challenge!”

How would exposure to role models enhance your educational experience?
- Overwhelming majority favored mentoring
  - need to share personal experiences with a woman

<table>
<thead>
<tr>
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<th>Graduating Seniors</th>
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<th>SWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prefer an upperclassman to show them the ropes; Don’t like forced mentoring relationships</td>
<td>It would give “what’s to come!” Would like someone in my area of interest.</td>
<td>Doesn’t matter that there weren’t any female professors. It would mean more to hear from a female engineer in industry – someone to go through it with you.</td>
<td>Want more female faculty in higher positions who know how we feel. Any help would be nice.</td>
<td>Help with personal problems – when you graduate you know what your up against.</td>
</tr>
</tbody>
</table>

If you were to design a WEP, how would you describe it or what components would it have? (summary was developed combining handout results and qualitative data from focus groups)
- In need of a women’s support group and office
- Advising/Counseling
- Renewable Scholarship
- Social Activities

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>A place or activity to meet other girls and adult women to talk to for personal and academic issues --</td>
<td>A place to hang out with other women for some “girl time” and activities addressing women’s issues: changing tires, finances, fixing a car,</td>
<td>Don’t segregate us from boys or single out as a woman; need an office area to talk to someone when we are discouraged; need assistance seeking</td>
<td>Mentoring/ networking; women’s boosters (lectures, and activities); advertise UMR’s services to women</td>
<td>Mentoring/ counseling; Programs to help women feel independent (fixing car, troubleshooting computer viruses,</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
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<th>M.S. candidates</th>
<th>SWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Let people know there are women here who succeed; add a beginning mechanics course or activity</td>
<td>Hire more female faculty and staff; improve female enrollment</td>
<td>Recruit more women – make them aware of choice; need student bonding – students are not socially inclined at UMR.</td>
<td>Hire female faculty and help them get tenure; improve social environment</td>
<td>Add more degrees (architecture, business, etc.); improve school pride and social environment</td>
</tr>
</tbody>
</table>

**Probe Question:** How do women students feel being in the minority on campus?
- It's an advantage!
- Personal attention
- Confident in their abilities and rise up to the challenge

<table>
<thead>
<tr>
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<th>SWE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nice – prefer hanging with the boys</td>
<td>Not bad – tends to be common with girls who like math and science</td>
<td>Like it – nice to compete against guys by teaming up with other girls to be better!</td>
<td>Doesn’t make a difference – I’m use to it.</td>
<td>It’s an advantage!</td>
</tr>
</tbody>
</table>