GIRLS PARTICIPATION IN MATH AND SCIENCE: A PROGRAM EVALUATION
OF EXPANDING YOUR HORIZONS

By

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ABSTRACT

GIRLS PARTICIPATION IN MATH AND SCIENCE: A PROGRAM EVALUATION OF EXPANDING YOUR HORIZONS

By
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Master’s of the Arts in Sociology

This project began as an evaluation of the Expanding Your Horizons (EYH) 2003 conference at Humboldt Sate University. EYH in Science and Mathematics are conferences created to promote and foster interest for girls in the areas of science and mathematics. The conferences are held with hopes that girls who attend will be encouraged to consider careers in these disciplines. Research indicates that our past experiences and achievements, social backgrounds, school climate, and interactions with others help to shape our interests and self-image. These findings are consistent with EYH conference goals: Girls need activities that connect to their personal world and knowledge of non-traditional female career options, in order to increase their interest and confidence in math and science fields.

The positive responses on the evaluations conducted on the same day girls participated in the conference spawned a new interest in whether or not these one-day conferences had lasting effects on girls’ decisions around math and science classes. Therefore, a longitudinal study was designed to try to answer this important question.
The outcomes of the longitudinal project will impact girls in a rural, economically disadvantaged area with a high Native American population. The local AAUW branch will use longitudinal evaluation reports to determine how to best use its resources to encourage girls to pursue careers in the math and science. This project not only serves as a means for exploring girls’ decisions about math and science courses and careers, but also provides a blue-print for future studies on this subject.
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CHAPTER I:  
INTRODUCTION

One of the greatest indicators that women will choose careers in math and science is the amount of science, technology, engineering, and math (STEM) courses they take in earlier years (AAUW 2004; AAUW 1994; Ainley 1993; Finn 1998; Silverman & Pritchard 1993; Xue & Atkins Burnett 1999). Though girls are now taking more math and science classes beyond the middle school level, there is still a large gender gap in the technological and physical sciences, such as chemistry and physics, which is particularly problematic as these fields begin to dominate given the significant role these fields play in our modern world (AAUW 2004; Lupart & Barva 1998).

In the past there has been little concern for the lack of female participation in the educational debate, as well as systematic disparities in the classroom, curriculum design, and in testing procedures (AAUW 2004). However, presently there are many programs in place whose sole purpose is to create an interest for girls in the STEM fields (AAUW 2004). Expanding Your Horizons (EYH) in Science and Mathematics is one of those programs.

This master’s project began in 2003 as an evaluation of the Expanding Your Horizons (EYH) in Science and Mathematics conference at Humboldt State University (HSU). EYH conferences were created to promote and foster interest for girls in the areas of science and math. Since the first EYH event, in 1974, more than 575,000 6th-12th grade girls and approximately 59,000 parents and educators have attended EYH conferences. In the 2000-2001 school year there were 100 individual conferences held in 29 states,
reaching 28,000 students. Humboldt State University is one of the host sites for EYH, and holds the conferences biennially. The message that EYH sends to girls is: *Take more math and science in high school, so you will have more choices later on.*

For decades, organizations have designed and implemented interventions to increase the confidence and involvement of girls in Science, Technology, Engineering and Mathematics (STEM) areas. However, there has been little research completed at the longitudinal level that examines program effectiveness.

After completing the evaluation of the local conference, we wondered whether or not the one-day conference had any long-term effects on girl’s high school course taking and career interests. To address these questions we designed a 2-year study and investigated funding opportunities. My master’s project also involved researching funding opportunities and developing the proposal for the National AAUW Community Action Grant fund.

This written report for my field placement consists of six major pieces: A review of the literature surrounding the process by which girls choose to take math and science courses; the 2003 evaluation report of the Expanding Your Horizons Conference, which was submitted to the steering committee and used to make decisions for the 2005 conference; the AAUW grant proposal for the longitudinal study; and the Inquiry and Collaboration grant proposal written to help subsidize the longitudinal study. I also include the research instruments, as well as other supportive materials that help to illustrate the process of this project.
CHAPTER II:
WHY DO GIRLS CHOOSE MATH AND SCIENCE COURSES?

Introduction

It has been 25 years since Congress passed the “Women in Science and Technology Equal Opportunity Act”, and there have been some major advances made for women in that time (Handelsman et. al. 2005). For example, girls are now taking more math and science classes beyond the middle school level, and there is an increasing number of female science majors at the college level (AAUW 2004). Further, there have been even greater advances made in the last 5-7 years regarding the amount of math and science classes girls are taking from middle school through college (AAUW 2004).

One of the greatest predictors for women entering careers in math and science is the amount of science, technology, engineering, and math (STEM) courses taken in earlier years (AAUW 2004; AAUW 1994; Ainely 1993; Finn 1998; Silverman & Pritchard 1993; Xue & Atkins-Burnett 1999). However, the differences in math and science course taking is a major contributor to gender differences in science and math achievement, which is directly related to females being kept out of higher paying careers that continue to be overwhelmingly male (Xue & Atkins-Burnett 1999).

This literature review will discuss the process of course selection among female students. Though its main focus is on high school aged females, there will be some discussion regarding the earlier years (i.e. middle school) because the research suggests that notions of “who we are” are crystallized during those earlier years, and very much effect our life decisions (AAUW 1994; Ainely 1993; Buck 2002; Dalgety & Coll 2004;
Harwell 2000; Leslie et. al. 1998). Though differences in math and science ability are minimal between males and females throughout all age groups, math abilities seem to decline earlier and more suddenly for girls (AAUW 1994; AAUW 2004; Ainely 1993; Leslie et. al. 1998). By the end of high school males take noticeably more science classes than females. Some possible reasons for this include: males generally rate the usefulness of science higher than their female counterparts, and males generally have more confidence in the STEM fields (Leslie et. al. 1998). In the next sections I will discuss several factors that affect the course selection processes: perceived ability; interest and utility; structural and institutional factors; pedagogy; social interactions with teachers, parents, and peer; and career aspirations and/or images.

Perceived Ability

When it comes to making decisions about courses taking, most of the literature mentioned prior achievement and perceived ability as central in this process (AAUW 1994; Ainley 1993; Catsambis 1994; Finn 1998; Harwell 2000; Leslie et. al. 1998; Tippins 1991). First, prior achievement, or completion of math and science courses, during the middle school years plays an important role in the course selection process for a few reasons: 1) it exposes students to different disciplines within the STEM fields, and 2) it gives students the academic background or prerequisites needed for future coursework in those areas (Ainley 1993; Finn 1998; Leslie et. al. 1998; Silverman & Pritchard 1993) However, there is some discrepancy in the literature regarding which is a better predictor: the number of classes taken or the types of classes taken. In other words, some of the literature suggests that the number of math courses taken is an important
predictor of students persisting in science and engineering (Leslie et. al. 1998), while others state that taking advanced coursework may be more important than the actual amount of math and science classes taken, with the most important being taking classes beyond the basic level (Finn 1998). Though there are different views on this type of achievement, most of the theorists agree that perceived ability or self-efficacy play a much larger role in both female and male persistence in the STEM fields than other fields (Buck 2002; Catsambis 1994; Harwell 2000; Tippins 1991).

Self-efficacy or perceived ability can be defined as: a person’s belief regarding his/her ability to achieve a certain task (Tippins 1991). It appears that adolescent boys of all ages are much more confident about their abilities in math and science than girls (AAUW 1994; Buck 2002; Harwell 2000), even though both girls and boys have similar performance levels (Catsambis 1994). For example, Tippins’ (1991) suggests that there is a correlation between perceived ability and course enrollment. In her study regarding the relationship of science self-efficacy and gender for 9th grade students, females not only displayed a lower level of self-efficacy in relation to science, but they also had lower levels of intentionality for taking more science classes in the future than did their male counterparts (Tippins 1991).

There is also a difference in how male and female students credit their achievements or ability in math and science. A qualitative study regarding girl and teacher perceptions of science courses illustrates this notion. Harwell (2000) found that while girls believed that their success was related to their own hard work, they attributed failure not to lack of effort but rather to their lack of ability. Female students tend to
attribute their success in math to diligence and effort, whereas male students tend to rate their ability as the secret to their success (Leslie et. a. 1998). This finding suggests that boys may overestimate their abilities, while girls underestimate them. One possible reason that male and female students have these different perceptions, regarding their ability in math and science, is that males generally take more risks in their test taking routines. Even though there are little or no actual ability differences between males and females, males generally have more confidence because of this risk taking behavior (Leslie et. al. 1998). Additionally, self-esteem plays a major role in perceived ability (AAUW 1994; Ainley 1993), and students with higher achievement in math and science see themselves as more competent in those subject areas (Ainley 1993).

Generally, males have a higher level of perceived competence than females, which provides one explanation for the persistence of males in the STEM fields. For example, achievement in the early years of school is highly associated with future participation rates in science (AAUW 1994; AAUW 2004; Ainley 1993). However, this is more true in the physical rather than the biological sciences (AAUW 2004). This occurs because physics and chemistry are seen as more difficult; therefore, students with higher achievement levels see themselves as more competent in those subject areas (Ainley 1993). Generally, males higher level of perceived competence helps to foster a greater interest in the STEM subject areas (AAUW 1994; Ainley 1993).

Interest and Utility

Interest and perceived utility (both in everyday life and occupationally) of math and science affect course taking decisions for female students. Studies have shown that
gender differences regarding attitude and interest in science are noticeable by the end of elementary school, and by middle school the gap between boys and girls interests is even wider (AAUW 2004; Ainely 1993). Though there have not been many studies surrounding interest and perceived usefulness, it has been found that the two variables are linked to persistent science course taking (Ainely 1993; Buck 2002; Harwell 2000). Males tend to rate the usefulness of math and science much higher than females. Because of this view males tend to place a higher value on math and science than females (Leslie et. al. 1998).

Some of the literature suggests that girls are more interested in math and science when they can relate it to their personal world (Buck 2002; Harwell 2000). Unfortunately, much of the science curriculum does not make this personal connection for students (Harwell 2000). For example, in a qualitative study by Buck (2002), which asked adolescent girls to discuss their feelings about the structure of middle-level science education, it was found that girls conveyed an authentic interest and aspiration to truly understand science as it relates to their worldview (Buck 2002). Further, they did not understand why their science classes did not apply to their world. What they did enjoy about their science classes included the hands-on activities such as experiments, drawing and fieldtrips that allowed them to make a connection to their personal world. A notable finding in this study was the teachers’ perceptions of the girls’ responses: they interpreted the girls desire for more-hands on activities as the girls really just wanting to have “fun.” Teachers did not understand the girls’ desires to connect the curriculum to their lives as a means of finding personal meaning in the curriculum (Buck 2002). Harwell (2000) also
found that female students had a strong desire for hands-on activities. Many of the girls stated that they felt a greater interest when they could actually see the effect of their project. Similarly, Silverman and Pritchard (1993) found that girls are discouraged from technological course taking when they are unable to connect classroom learning with careers.

Finally, in this section we looked at perceived ability, interest and utility. In the next section we will consider the structural factors that help to shape girls decisions about course selection. That is, we can only choose what we know within any given social structure, implying that our choices and interests rely on what are offered as options (Ainely 1993).

Structural and Institutional Factors

For some students the process of selecting courses is partially determined by structural factors within the school. Students are limited by individual school course offerings, school timetables, and rules regarding course selection, such as prerequisites for any given course. Math and science courses have the potential to act as gatekeepers, especially for the advanced courses that are not available in all schools or to all groups of students. For example, a study of course offerings in the early 1990’s found that calculus was offered 4 times as much at wealthier schools (Finn 1997). Though this finding shows the disparity between lower and higher income schools, this and other research (AAUW 2004) suggests that the related lack of flexibility in offerings create a barrier to female enrollment in math and science electives.
For example, Silverman & Pritchard (1993) found that a lack of flexibility in the number of elective courses deterred college bound female high school students from taking technology education. Many times students are only allowed to take two electives, and those who plan on continuing on to college find that they need to take a foreign language and arts class. Technology courses may also be worth fewer credits than their traditional academic counterparts. Therefore, as students are making decisions about courses, they may avoid the “lighter” credit courses to reduce their time to graduate (Silverman & Pritchard 1993). In addition, by the time students reach their senior year and have accomplished all of their college prerequisites, they choose to take an elective of a current interest rather than trying something new such as a technology course (Silverman & Pritchard 1993).

Ainley (1993) found that the most common reasons given by students for being unable to take a class of first choice was that the course was not being offered, or there were time conflicts with other classes. Only a few students said that not finishing previous classes prohibited them taking a course of their choice. Not all schools offer the same courses, which may reflect the different expectations held by schools for the kinds of courses their students will choose in higher education (Ainley 1993). There are also differences between rural and urban schools in science and math participation, which may reflect social values in the different communities, as well as differences in resources.

School competitiveness also affects the course taking practices of girls differently than it affects that of boys. When schools are more competitive, girls are less likely to take advanced science courses than are boys. The boys persist in their course trajectories
even when there is high academic pressure (Xue & Atkins Burnett 1999). This study also noted that “girls in competitive classrooms have less positive attitudes toward mathematics than boys, while few or no gender differences were found in classrooms with [less]...competition” (Xue & Atkins Burnett 1999: 4). One explanation for this gender gap is that girls favor cooperative rather than competitive learning. Cooperative learning increases the achievement levels and interest of girls across all academic subjects without negatively affecting outcomes for boys (Xue & Atkins Burnett 1999).

Experience of math and science courses and subsequent enrollment decisions can also be affected by the gender mix of the classroom. Mixed gender rather than all-girl classrooms are more likely to generate competition which inhibits girl’s math and science participation rates (Crombie 1999). In addition, teachers may unknowingly contribute to these inequities through their own gendered expectations and actions as they interact with girls and boys differently (Crombie 1999).

One study compared a single gender computer class to a mixed gender computer class. Girls from the all-female section and boys, from the mixed class, felt similar levels of teacher support. However, girls from the mixed gender sections reported less perceived support. Girls from the all-female class and boys reported similar levels of confidence and intrinsic value in computer class; however girls from the mixed gender class reported lower levels. Finally, girls from the mixed gender class said they were less likely to take more computer science courses in the future, or pursue careers related to computer science (Crombie 1999).
The girls from this study stated that the “know it all boys” and their competitiveness affected their feelings of teacher support. According to students’ perceptions, this finding suggests that teachers were relating to the boys and girls differently in the mixed classroom; not only through their own gendered perspectives, but also through the boys’ desire for competition.

This section examined structural factors involved in the female course selection process. The following section will discuss pedagogy, or the ways in which teachers’ present curriculum that can either negatively or positively affect girl’s perceptions of math and science (AAUW 1994; Buck 2002; Crombie 1999; Harwell 2000; Tiedemann 2002).

**Classroom Pedagogy**

Traditional math and science pedagogy has been a barrier to female participation in STEM fields (AAUW 1994; Buck 2002; Crombie 1999; Harwell 2000; Tiedemann 2002). Traditional math and science instruction has fostered passive learning styles that ask for “right answers” rather than a more active learning approaches that facilitate open-ended discussions, creative problem solving and personal-connections to the course content (Harwell 2000). Math and science pedagogy has been associated with male learning styles. Male learning styles are conceptualized as individually oriented, competitive, and more tolerable of abstract learning; whereas, female learning styles are defined as more collaborative and cooperative, with a need for real-world connection (AAUW 1994; Buck 2002; Harwell 2000). Teacher’s pedagogical styles not only affect
the classroom experiences, but in turn shape students’ beliefs about their math and science abilities at a formative time in their education.

While teaching style choices are critical to short-term and long-term decisions made by girls and boys, teachers do not always understand the gendered differences in the ways in which girls and boys experience pedagogy. A qualitative study by Buck (2002) on 6th - 9th grade girls found that the teachers had different interpretations of the classroom and the girls’ actions than the girls themselves. Girls reported that topics were boring. They also felt unsupported in their efforts to understand science and they did not feel they could get enough explanation from their teachers. Ironically, many of the teachers perceived the girls as having a deficit in maturity. They felt it was their role as teacher to help the girls fit into the science curriculum by teaching in standard ways that were not grounded in application to everyday experiences.

Similar incongruencies between student and teacher perceptions have been documented in other qualitative studies. For example, Harwell (2000) found that even though many teachers tried to use new teaching strategies to create student interest in their topic, the teachers still retained negative perceptions of girls classroom behavior. These teachers believed that girls’ expressed need for more hands-on-learning was an indication that “girls just want to have fun” (232). It is telling to note that in this same study, only a small percentage of teachers attempted to make science “fun” for their students (Harwell 2000). The orientation that science (and math?) are not to be made “fun” is indicative of the male centered pedagogy in STEM fields that privileges those who find enjoyment in the ideas themselves. For girls to find similar enjoyment in the
subject, application to their own life and concerns is important (Seymour & Hewittt).
The idea of “making something fun” in some minds belittles the calling of science.
Therefore, in this same study, the researcher discovered resistance to incorporating new
types of curriculum that are conducive to female style learning.

These and other studies (AAUW 1994; Crombie 1999; Tiedemann 2002), suggest
that these early course experiences do affect future course selections. Classroom
pedagogy affects teachers’ direct interactions with students. These interactions also
influence course-taking decisions. If girls in the middle school years do not have
positive, interesting, or career-connecting experience with math or science, they are
unlikely to enroll in those courses when they are given an option.

Social Interactions

Outside influences such as teachers, parents, and peers can have a significant
impact on female interest and course selection. It is the interactions with parents,
teachers, and peers that help to form goals. Life-goals (for females) are usually formed in
a response to the wants of others, and because, “female self-worth in science and
engineering is extrinsically based...selection of a college major in science and
engineering is externally rather than internally driven” (Leslie et. al. 1998: 266). In other
words, females, in part, make their decisions regarding course taking due to outside
influences or interactions with teachers, family, and peers. Whereas, males are more
likely to make those decisions based on internal factors, such as perceived ability and
interest (Leslie et. al. 1998).
Teacher interactions

Teacher’s interactions with female students play a significant role in the course selection process (AAUW 1994; Buck 2002; Crombie 1999; Harwell 2000; Tiedemann 2002). Teachers can have a negative impact on girls’ perceptions of math and science by showing boys more attention in class, asking boys more complex abstract challenging questions, praising boys more often than girls, and blaming failure for boys on lack of effort and girls for lack of ability (Buck 2002; Crombie 1999; Harwell 2000; Tiedemann 2002). When girls encounter these negative classroom experiences they are tracked away from courses of study in math and science: career paths that can also lead to higher paying careers (AAUW 1994).

Gender stereotyping by teachers also plays a significant role in math and science instruction. This is illustrated in Tiedemann’s (2002) study regarding science teachers’ perceptions of female students. Tiedemann found that gender stereotypes have a substantial influence on teacher’s perceptions of low performing girls. Teachers’ gender stereotyping helps to define their specific beliefs about their students ability and effort, but only for average and low achieving students (the higher achieving students were not as subject to gender stereotyping). These gender stereotypes held by teachers greatly benefit the boys in the classroom, while being detrimental to their female counterparts. For example, boys receive more attention, praise, critical feedback, and remediation than girls (Tiedemann 2002). This type of inequality in the classroom helps to denigrate female experience in STEM areas; and therefore, shape their own perceptions surrounding personal ability and interest.
Parental interactions

Parents can also have an impact on the female course selection process. Some of the literature states that parental attitude regarding science influences children’s perceptions (Dalgety & Coll 2004; Leslie et. al. 1998). For example, one study found that the mother’s education level had an effect on the physical science/engineering degree attainment by their daughters, possibly pointing to the maternal role model; whereas father’s science occupation and educational level did not have as much an effect (Leslie et. al. 1998). Conversely, another study found that females whose fathers were engineers were much more likely to enter into engineering professions (Dalgety & Coll 2004). Though these findings differ, the one thing they both have in common is that parents (mother and/or father) are effecting girls decisions to take math and science courses.

Parents have the ability to influence their children’s perceptions, about math and science, through explicit support of extra-curricular science activities or through participation in the science industry (Dalgety & Coll 2004). Through parental involvement of extra-curricular science activities or working in the science industry, parents are sending their children general messages about the value of science. In a home that is not science oriented, the child receives very little exposure to the field. Parental influence seems to be the greatest at the elementary and middle school levels; however, once a student reaches high school, the parental influence factor drops (Leslie et. al. 1998). Before high school parental support has been named as the most influential factor on student science behavior- however, at this juncture females are more likely than males to be influenced by parental opinion, because females are more externally driven than
their male counterparts (Dalgety & Coll 2004; Leslie et. al. 1998). Once females reach high school their peers are more likely to become greater influences on their academic interests than their parents (Leslie et. al. 1998).

**Peer interactions**

Finally, peer groups are formed on the basis that they reinforce an individual’s background and interests (Dalgety & Coll 2004). However, at the middle school level children with positive feelings towards science generally have friends within their peer group with less positive feelings (Dalgety & Coll 2004). But by high school, students generally choose peer groups that reinforce their backgrounds and interests (Dalgety & Coll 2004). For example, students who have a background in science are more likely to choose friends who also have a background in science.

As mentioned previously, female students tend to be more other-directed; therefore, female students are more likely to be influenced by their peers than their male counterparts (Dalgety & Coll 2004; Leslie et. al. 1998). This is believed to occur due to the dramatic decline in self-esteem for females in early adolescence, which causes girls to become more other-directed in their feelings about themselves (AAUW 1994; Dalgety & Coll 2004). One explanation for this decline in self-esteem relates to body image, and the message the media is sending to girls (Kilbourne 1987). The message is very clear: Women need to be attractive, thin, and in a relationship to be valued (Children Now 1997; Kilbourne 1987). The media’s impact on adolescent female self-esteem plays a role in not only what they as individuals place value on, but it also reinforces their other-directed behavior. For example, girls are faced with unattainable images presented in the
media, and are told repeatedly, by different media sources, that they must attain such goals in order to be valued (Kilbourne1987). Because most of the images are unattainable, popularity, for many, becomes important. Therefore, it can be assumed that many young females are aware of what others think of them, whether it’s what they like or don’t like, how they act, or what their values or interests are (Dalgety & Coll 2004).

Consequently, girls who do not already have an interest in math and science by high school, and who have chosen peer groups based on those who value the importance of appearance and popularity, are less likely to show a new interest in math and science in their high school years. This can be attributed to what their current peer group values (Leslie et. al. 1998). The priority that girls place on popularity effects how they see themselves in the future. Without the general interest in exploring math and science subject areas, it is hard to see oneself persisting in those fields.

Career Aspirations

The last major theme found in the literature regarding course selection was career aspirations. Gender stereotypes also play a role in the formation of career-aspirations. All adolescents differentiate between the sexes and such differences amplify the pressure and challenges for girls as they enter into young womanhood (AAUW 1994). Gender stereotypes are still a key force in determining career prospects for adolescents (AAUW 1994). For example, girls are much more likely to want to be interested in social sciences, health services, and education; while boys are more likely to be interested in careers in business, technology, and engineering (AAUW 1999).
Further many women see an incompatibility between science careers and family life. Women who place a high value on family are not as likely to take courses in science and engineering (Leslie et. al. 1998). There is a clear relationship between career aspirations, prior achievements, experiences and interactions. Our past achievements, experiences, and interactions help to form our career interests (Catsambis 1994; Crombie 1999; Leslie et. al. 1998; Wai-ling Packard & Nyguyen 2003).

One theory that helps explain this relationship is the Possible Selves theory. Wai-Ling Packard & Nguyen (2003) use this theory to explain why females choose math and science courses. Possible selves can be defined as “what people hope to become, expect to become, and fear becoming in the future” (252). These images motivate behavior and push people to work towards the images they hope or expect, and avoid those that they fear. It is in adolescence that young people form their identities, as they try to decide who they are.

Some possible selves are seen as more probable than others, due to the available role models and structural opportunities in our lives (Wai-Ling Packard & Nguyen 2003). Therefore, our achievements (perceived and real), experiences, and social interactions allow us to shape ideas about who we want to become; and “in order for women to persist in science they need to maintain positive views of themselves as future scientists” (Wai-Ling Packard & Nguyen 2003: 252). The Possible Selves theory allows for a better understanding of how women’s “future images of themselves guide their career choices” (252).
As young people try to figure out who they are and who they would like to become, the formation of career related possible selves is one of the most significant developmental responsibilities in adolescence. Young women attribute stable career paths with relationships with female role models, and opportunities to explore new experiences and interests (Wai-Ling Packard & Nguyen’s 2003).

In the Wai-Ling Packard & Nguyen study (2003), researchers examined intensive science programs and related retention of women in the sciences. They found that mentoring relationships that were developed through intensive programs or internships are significant for stable career pathways.

At the time of the study, 30 of the 41 participants were still pursuing careers in STEM areas after high school graduation. Six of the participants maintained their initial aspirations through involvement in several academic programs, opportunities in the workplace, and mentors who taught them about desired careers. Twelve of the participants chose their current aspiration from some of their initial aspirations through other methods: work related experience, family support, financial promise, and high ability/enjoyment. Eight participants developed a new math/science aspiration (7 of the 8 were in STEM field) after exploring their initial aspiration and discovering that the dream involved many work hours with inadequate financial rewards. Even though they may have learned about a particular career early in life, they did not feel that they had enough information to know if it suited them individually.

Another theory that has the potential to explain how girls make decisions surrounding course selection is the Life-Goal theory. Life-goals are usually formed in a
response to the wants of others. “Commitment is known to be the most potent predictor of persistence in all human endeavors” (Leslie et. al. 1998: 266.) As mentioned previously female’s confidence in science is generally extrinsically based, which is also true in their decision-making process regarding which courses to take, as well as in which fields to major. Persistence is connected directly to the degree of goal commitment, most specifically in engineering. Therefore, women, more so than men, require a genuine interest in chosen careers. Some scholars suggest that as students in middle school are forming their course interests there is a lack of knowledge regarding the career opportunities in technological fields; and what is known to the students is predominately seen through a gendered lens (Silverman & Pritchard 1993).

This notion of a lack of knowledge is illustrated in Silver and Pritchard’s (1993) study regarding the effect of guidance counselors on girls’ decisions to enroll in technology education. In this study guidance counselors stated that girls are not well informed about technological careers. It was also found that students who were entering into 9th grade did not have very much information regarding careers. Though both girls and boys lack information, girls in particular lack the knowledge to consider non-traditional careers. For example, one counselor in this study said that, “girls often see work as either some kind of profession, like lawyer or doctor, or work in an office or store” (4). This lack of knowledge regarding careers in science suggests that girl’s gendered views of careers are still a major cause for the lack of female persistence in math and science related careers.
Discussion

In this review, we explored the relationship between girls STEM course taking and perceived ability, interest/utility, structural/institutional factors, pedagogy, social interactions, and career aspirations. Much of the research suggested that our past experiences and achievements, social backgrounds, school climate, and interactions with others help to shape our interests and self-image. None of the literature pointed to just one of these factors in contributing to the course selection process. In fact, most scholars named more than two factors in various combinations as playing a significant role in course selection for females.

However, the most commonly discussed finding seemed to involve the notion that positive experiences and attitudes are the best predictor for future behavior in math and science related activities (AAUW 1994; Ainley 1993; Buck 2002; Catsambis 1994; Finn 1998; Harwell 2000; Leslie et. al. 1998; Tippins 1991). This finding suggests that a major level of intervention should involve creating a positive experience for girls in the areas of math and science, which was attempted by the Expanding Your Horizons Conference (Chapter 4).

In the next chapter I look at several social interventions as a means to encourage girls’ full participation in STEM areas. In that section I use Straus’s (1984) model of sociological interventions as the theoretical framework to discuss interventions that speak too many of the themes discussed in the literature review.
CHAPTER III
ENCOURAGING GIRLS:
POINTS OF SOCIOLOGICAL INTERVENTION FOR MATH AND SCIENCE PARTICIPATION

The themes found in the literature point to various social areas in which interventions can be made to encourage female participation in the STEM areas. This section will use Straus’s (1984) notion of sociological interventions as a means to synthesize the ideas found in the literature, as well as frame the entire project. That is, Straus’s model can help to illustrate how EYH and the longitudinal study have acted as interventions to increase girls’ participation in math and science.

The process of sociological intervention takes into account the various interacting levels of social participation. Thereby, framing human problems as a means to come to some resolution (Straus 1984). There are four different levels of social participation: individuals, groups, organizations, and worlds. Each level is connected to the next level of social participation in a dialectical synthesis. For example, individuals make up groups, and groups create organizations. Though each level is connected to the one below and above, they each have different targets of interventions. These targets are as follows: individuals and conduct; groups and role structure; organizations and institutions; worlds and culture (Chart A).

In order to apply Straus’s notion of sociological interventions to the issue of female participation in math and science, we must breakdown the themes in the literature
according to the various levels of social participation. However, it is important to note that each theme does not necessarily apply to just one level of participation. That is, each level exists in relation to another, suggesting that without one level the one before or after could not exist. This dialectal process assumes that all factors involved have a relationship, and therefore do not necessarily fit neatly into one category. But for our purposes here, each theme will be explored in a single category of social participation.

Chart A: Sociological Interventions

World
Target: Culture

Personal
Target: Conduct

Group
Target: Role Structure

Self Esteem
Perceived Ability
Interest
Teachers
Family
Peers

Personal Level

The first level of social participation is the individual/personal level and the target for intervention is conduct. At this level it is important to not only focus on a person as an individual with individual problems, but also see the individual as a member of the larger
society. Therefore, when looking for points of intervention in the *personal* realm one should acknowledge the following factors: 1. The individual has internalized the socio-cultural realities that surround and organize behavior, and 2) the social context in which the individual participates affects individual behavior.

The *personal* level of social participation for females in the area of math and science includes, but is not limited to: Interest, perceived ability, and self-esteem (Figure A.1). These three themes, which fall into the realm of the *personal*, can be visualized as targets for sociological intervention. That is, they directly affect the behavior of choosing to persist in the areas of math and science, as suggested by much of the literature (AAUW 1994; Ainley 1993; Catsambis 1994; Finn 1998; Harwell 2000; Leslie et. al. 1998; Tippins 1991). Therefore, interventions in the *personal* realm should include activities that increase interest, self-esteem, and confidence. Some examples of social interventions in this area are: intensive workshops, like Expanding Your Horizons, that allow girls to explore different areas of math and science that might be of interest to them individually; more one on one time with school staff or tutors to realize their ‘true” ability rather than perceived; and support groups for females incorporated into the school day to help build self-esteem. As mentioned previously, theses targets and interventions in the *personal* realm are directly related to the next level, the *group* level.
Group Level

The target for intervention at the group level is primarily directed at the role structure. In other words interventions should be aimed at individual roles we play in any given social context. At this level one must take into account: factors of authority relationships, agreements (both spoken and unspoken) regarding roles and their limitations, the degree of involvement in roles, role conflict, and the extent of which the social definition of the group facilitates or hinders realization of its ‘collective’ purposes.

When looking at the group level of social participation and female persistence in math and science, it is important to consider the social interactions in their lives (AAUW 1994; Buck 2002; Crombie 1999; Dalgety & Coll 2004; Harwell 2000; Leslie et. al. 1998; Tiedemann 2002). For example, much of the literature pointed to girls’ interactions with teachers, parents, and peers as having some kind of an impact of their interest or perceived ability in regards to math and science. Therefore, the targets for intervention at this level include: teachers, family, and peers (Chart A). The Expanding Your Horizons conferences (EYH) also target the group level (Figure A.2). Some goals of the EYH conferences include: training teachers to acknowledge their gender stereotypes; involving
parents in math and science related academic activities; and showing the value of math and science to students through engaging interactive activities (see chapter 4). The group level of social participation is directly related to the organizational realm in that groups form organizations.

Figure A.2: Interventions at the Group Level

Organizational Level

The organizational level consists of groups, and the target for intervention at this level is the institution. For change to occur at this level an emphasis must be placed on redefining the situation. To redefine the situation one must acknowledge the institutionalized patterns of interactions among groups rather than individual role interactions that occur inside groups. In other words, within institutions patterns of interactions emerge that give the individual a roadmap for interaction, which help to form our various social institutions. Therefore, in order to create change in this realm one
must focus attention towards those routinized interactions that occur between groups (which consist of individuals), in order to create change within the actual institution.

When looking at female persistence in the STEM areas at the organizational level one must consider the social institutions that perpetuate male dominance in such fields. The literature suggests that socio-structural factors within the educational institution are a barrier to female persistence (AAUW 2004; Ainley 1993; Crombie 1999; Finn 1997; Silverman & Pritchard 1993; Xue & Atkins Burnett 1999). Therefore, the points for intervention at the organizational level include, but are not limited to: school curriculum, pedagogy, and classroom organization (i.e. mixed gendered classes) (Chart A). Some possible ways to help redefine the situation through these targets include: changing the school curriculum so that it is not as male-centered; again, training the teachers to recognize their gender bias in the classroom; changing the process in which they relay information; and integrating the single gendered classroom as an option for students in math and science classes (Figure A.3). Again, the EYH conferences aim directly at the targets of interventions for the organizational level. They provide information to teachers, parents, and students, to challenge the way females are viewed in SMET fields. The organization realm is directly related to the last level of social participation, world, because our institutions reside within the larger social structure that is created by individuals.
Finally, the world level of social participation not only helps define the individual, but is also defined by the individual. The target for sociological intervention at this level is culture. Intervention at this level appears to be the most difficult, because it involves redefining social ideologies that are deeply ingrained within any given culture. However, because the world realm is directly related to the personal realm one can target individuals with the hope for redefinition.

In order to relate this realm to issues of female persistence in math and science, one needs to consider the gender stereotypes that are deeply ingrained in our culture (AAUW 1994; AAUW 2004; Leslie et. al. 1998; Silverman & Pritchard 1993; Wai-Ling Packard & Nguyen 2003). Such stereotypes help to form gendered career aspirations, which influence student course choices (Leslie et. al. 1998; Silverman & Pritchard 1993; Wai-Ling Packard & Nguyen 2003). Therefore, the targets for intervention at the world level need to include gender stereotypes and career aspirations (Chart A). Some possible interventions in the world realm include: again, training teachers and school staff to
acknowledge their gender stereotypes; integrating career counseling into the high school curriculum, which allows students to acknowledge their different options; and holding career fairs that include female professionals who can discuss different career paths with female students, and producing popular and accessible literature (Figure A.4).

![Figure A.4: Interventions at the World Level]

When looking at this model it is important to acknowledge that each level is interrelated. As individuals we not only shape our world, but our world helps to form our individual identities through group interaction. Which, in turn, helps to define our institutions that we create within our cultural capacities. Therefore, social participation can be thought of as a process of defining and redefining social realities. It is through this process of definition and redefinition that we have an opportunity to intervene and create social change, because it is we as individuals that shape our social world.

The following chapters are examples of intervention strategies used to increase female participation in math and science. Chapter 4 consists of an evaluation of the 2003
EYH conference, which demonstrates targeting, most specifically, the personal and group realm of social participation. Finally, chapter 5 and 6 consist of grant proposals that evaluate the effectiveness of the conferences in increasing girls’ participation.
Expanding Your Horizons

2003 Conference Evaluation
Expanding Your Horizons: A Brief History

Expanding Your Horizons in Science and Mathematics (EYH) are conferences created to promote and foster interest for girls in the areas of science and math. The conferences are held with hopes that girls who attend will be encouraged to consider careers in these disciplines. In 1976 the Math/Science Network formed the first EYH conference held at Mills College in Oakland California.

The Math/Science Network was originally created in 1974 by a group of female math and science educators in San Francisco. The founders of the Math/Science Network were concerned with the low participation rates of females in math and science courses. It was this initial concern that spawned what is now known as a nationally recognized effort.

Since the first EYH event more than 575,000 6th-12th grade girls and approximately 59,000 parents and educators have attended EYH conferences. In the 2000-2001 school year, there were 100 individual conferences held in 29 states, reaching 28,000 students. Humboldt State University is one of the host sites for EYH. The goals of the conference are:

- To provide young women with opportunities to meet and interact with positive women role models who are active in math and science related careers;
- To involve young women with limited opportunities for success in positive experiences in mathematics and science;
- To increase the interest of young women in math and science by providing exciting and fun hands-on learning experiences;
- To encourage young women to study as much math and science as possible by showing them the benefits of education and its relevance to their lives;
- To foster awareness of career opportunities in science and math related careers.
EYH at Humboldt State University

Humboldt State University (HSU) held its first EYH conference in 1982, which was organized and directed by Phyllis Chinn. Through 1989 the conferences were held annually for 6th through 12th grade girls (in 1995 HSU limited its conference range to 6th through 8th grade girls, due to the high number of girls attending and the lack of human resources available to accommodate the high number of attendees). Despite the shift in grade range, 400 girls attended the conference at HSU in 2001, illustrating the popularity of EYH.

Theoretical Rationale

Even though girls perform as well as boys in science and math, there is a marked loss in interest in Science, Technology, Engineering and Math (STEM) areas that occurs in middle school (AAUW 1999: Fennema and Sherman 1978: James and Smith 1985; Schreiber 1984; White 1992). There are many possible causes for this change in interest. Different expectations for girls and boys can lead to gender bias in the classroom (Becker 1981; Eccles-Parsons 1984; Gilbert & Taylor 1991; Kahle 1990; Wilkinson and Marrett 1985). While research has noted the importance of strong female models in encouraging interest in STEM (Wertheim 1995), k-8th grade school teachers who are predominately women (Blank and Langesen 2001; Henke et al. 1997) often themselves lack confidence in these areas (Weiss 1993). This lack of confidence compromises their ability to model an affinity between girls and science.
Methodology

This report is based on data from the EYH 2003 conference at HSU. Two hundred and fifty one girls and 231 adults and educators attended. After the event the girl participants, adult participants, workshop presenters, and volunteers were asked to complete an evaluation form about their experience. Eighty one percent (203) of the girls submitted evaluations, 46 percent (43) were submitted by workshop presenters, 4 percent (4) were submitted by volunteers, and 100 percent (47) were submitted by adult participants.

The questionnaires administered to the conference participants consisted of both open and closed-ended questions. For example, the participants were asked to give their demographic information, rate their experiences, write any additional comments, as well as comment on their personal experience with the conference. Therefore, both quantitative and qualitative analysis was used in analyzing the success of the local EYH conference. The quantitative portion of the study included demographic information as well as general attitudinal questions that may provide some insight into the attendees’ experience. Additionally, the qualitative portion consisted of open-ended questions, which allowed the attendees to express their individual experience with the conference.

EYH planners offered an EYH tee shirt with proven popularity in the past as an incentive for completed evaluations. During the sign-in portion of the event, all of the participants received the evaluations with other materials needed for the day. When the participants received the packets and materials they were told about the incentive offered
for the finished evaluations. After the closing activity (What’s My Line?) the participants were reminded to fill out their evaluations, and as they left the conference the evaluations were traded for a tee shirt. The evaluations were then collected by an HSU sociology graduate student.

A graduate and an undergraduate student coded and entered the quantitative data into SPSS for analysis. The qualitative data was word processed by a conference administrative assistant, and then entered into the NVivo program. After the data was entered into both programs the graduate student ran frequency distributions and cross tabs in SPSS. Patterns and themes were established among the respondent’s comments. The acknowledged themes will be discussed in this report.

Finally, there were a few limitations regarding this study that warrant discussion. There were a few questions on the girl evaluations that seemed to cause confusion. First, the girls were asked to circle the race/ethnicity with which they identified with. They were given six options: African-American, Native American, Euro/Caucasian-American, Asian American, Hispanic, and other. The girls were instructed to circle all that apply. Many of the girls seemed confused and circled either “Euro” or “Caucasian”, and some girls wrote in the “other” category things like “Irish”, “American”, etc. The confusion that occurred suggests the need to refine this question for the girl participants in the future. Additionally, those who circled “Native-American” and some other ethnicity were coded as Native American. Therefore, when looking at the demographic information it is important to keep in mind that those listed as Native-American might have circled
Native-American and some other ethnicity. As a final point, the question regarding prior interest and present interest in math/science was also an issue of concern. That is, the question assumed that the participants held math and science as equal fields of study, rather than as two separate entities. This question in the future should be rephrased, and divided into two separate questions so as to increase the validity of the question.

**Girl Participants**

**Demographics**

**Grade.**
The girls who attended the conference ranged from 6th to 8th grade; however, there was one respondent who indicated she was in 5th grade. The majority of the girls (42 percent) were in 7th grade, 35 percent were in 6th grade, and 23 percent were in 8th grade.

**Location.**
The girls came from 34 locations in Humboldt County, as well as its surrounding areas. Arcata and Eureka represent the largest urban centers with 17% of the girls coming from Arcata and 13% from Eureka. Fourteen percent of the girls were from Trinity, which is rural with a more dispersed population base. Of the participants from Trinity County half (7%) were from Willow Creek and half (7%) were from Hoopa, an Indian reservation that bused a group of students to the conference with financial support from EYH. Additionally, 5% of the girls were from both Crescent City and Leggit. The school locations with the fewest number of attendees (at .5% or one girl) included: Blue Lake, Loleta, Lewiston, Whitethorn, Kneeland, and Trinidad. Though
Blue Lake, Loleta, and Trinidad are no further than approximately 15 miles from Arcata where the conference was held, they are all smaller towns, which may attribute to the low number of girls attendees. Lewiston and Whitethorn are both smaller towns approximately 100 miles from Arcata, which may be the reason for the low number of girls from those locations.

Race/Ethnicity.
The girls were asked to circle the race/ethnicity they most identified with: Asian-American, African-American, Hispanic, Native American, Euro/Caucasian, and Other. The girls were told that they could circle all that applied to their personal racial/ethnic identity. Sixty-five percent of the girls identified themselves exclusively as Euro/Caucasian, and 35 percent of the girls identified with some minority group: Native American (18%), Other (9%), Asian-American (3%), Hispanic/Native American (2%), African-American (1%), and one attendee was African-American/Hispanic.

Table 1: EYH 2003 Ethnic Background of Girl Participants

<table>
<thead>
<tr>
<th>Ethnic Background</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euro-American/Caucasian</td>
<td>125</td>
<td>65%</td>
</tr>
<tr>
<td>Native American</td>
<td>34</td>
<td>18%</td>
</tr>
<tr>
<td>Other</td>
<td>19</td>
<td>10%</td>
</tr>
<tr>
<td>Asian American</td>
<td>6</td>
<td>3%</td>
</tr>
<tr>
<td>Hispanic/Native American</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>African American</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>African American/Hispanic</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>192</td>
<td>100%</td>
</tr>
</tbody>
</table>

*11 girls did not report ethnic demographic information
Conference Evaluation

Recruitment/Marketing

The majority of the girls (72%) reported that they heard about EYH from their teacher, 17% reported they had heard about EYH from a friend, 16% from a parent, 12% from a school visitor, and 11% reported that they heard about EYH from a source other than those listed on the evaluations. Some of the other sources listed by the girls included: radio, mail, Internet, and a pamphlet given to the school.

Recommend conference

The girls were asked if they would recommend EYH to a friend. This question has the potential to be very telling of the girl’s experience with EYH. It not only allows the respondents to reflect upon their personal experience, but it also helps to determine if the respondents feel that others in their age group would enjoy a similar experience. The results were promising: The majority of the girls reported that they would absolutely recommend EYH to a friend, a significant number reported they would probably recommend EYH, and only 3% reported that they would probably not recommend EYH to a friend (Table 2)

<table>
<thead>
<tr>
<th>Ratings</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolutely</td>
<td>116</td>
<td>61%</td>
</tr>
<tr>
<td>Probably</td>
<td>68</td>
<td>36%</td>
</tr>
<tr>
<td>Probably Not</td>
<td>5</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td>189</td>
<td>100%</td>
</tr>
</tbody>
</table>

* 14 Girls did not respond to this question
Pre/Post interest in math and science

We also compared the girl’s interest in math and science before and after the conference. The data suggests that the majority of the girls already had an interest in math/science before the event, and attending the conference increased their already present interest. A small, but significant, number ($p< .05$) did not have any previous interest in math/science, but after attending the conference their interest increased. Finally, about 15% of the girls had a previous interest, but after attending the conference they did not show an increased interest in math and/or science. It is possible, but not likely, that EYH had a negative impact. The probability of this is low because other information gathered from the evaluations seems to suggest that overall the girls had a good, if not great, experience with EYH. It seems the most likely reason for there not being an increased interest is that there was simply no change in the interest of math/science for those girls (Table 3).

<table>
<thead>
<tr>
<th>Had Interest Before Gained Interest After</th>
<th>Had Interest Before Did Not Gain Interest After</th>
<th>No Interest before Gained Interest After</th>
<th>Did Not Have Interest Before or After</th>
</tr>
</thead>
<tbody>
<tr>
<td>74%</td>
<td>15%</td>
<td>9%</td>
<td>2%</td>
</tr>
</tbody>
</table>

*25 girls did not respond to this question

In addition to the closed ended questions the girls were also asked a series of questions that asked them additional comments regarding their experiences. The analysis that follows will look at those questions.
Program packets and materials

When the girls signed in at the conference they were given program packets that included various items: pencils, tattoos, science kits, etc. The girls were asked to rate the packets, and provide additional comments regarding them. The majority of the girls rated the packets/materials as excellent, a considerable number of girls rated the packets as good, and only a few girls said the packets were fair (Table 4).

Table 4: Girls Evaluations of Packets and Materials

<table>
<thead>
<tr>
<th>Packet Ratings</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>121</td>
<td>65%</td>
</tr>
<tr>
<td>Good</td>
<td>59</td>
<td>32%</td>
</tr>
<tr>
<td>Fair</td>
<td>5</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td>185</td>
<td>100%</td>
</tr>
</tbody>
</table>

* 18 girls did not respond to this question

When asked to comment on the packets the general consensus among the girls was that the packets were “cool”:

- Cool pictures and packet books
- Cool, it’s neat that we get to keep them
- I think this is so cool
- They’re really cool, so I can always remember today

Besides the packets and materials being cool, some additional comments made by the girls included statements such as:

- I liked them they are so cram packed that you can barely close the folder
- I’m looking at the papers and learning how important science and math really are in life
- It makes us feel older
- They are very informative and a good investment
Finally, there were a few girls who made comments about how they felt their experience with EYH was great for girls in general. The statement that follows illustrates this goal of EYH: One girl wrote, “This is very cool it is so cool to know that there are people who help girls achieve their goals”.

Guest speaker

Another question asked of the girls concerned the guest speaker, Dr. Sandra Magnus, a NASA astronaut. A high percentage of the girls (86%) stated they really enjoyed her talk and presentation, where 12% rated her as good, and only 2% rated her presentation as poor (Table 5).

Table 5: Girl evaluations of Guest Speaker

<table>
<thead>
<tr>
<th>Ratings</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>170</td>
<td>86%</td>
</tr>
<tr>
<td>Good</td>
<td>23</td>
<td>12%</td>
</tr>
<tr>
<td>Fair</td>
<td>4</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td>197</td>
<td>100%</td>
</tr>
</tbody>
</table>

* 6 girls did not respond to this question

In conjunction with the scale in which the girls rated Dr. Magnus, the majority of the girl’s comments were positive. Many of the girls wrote about the video she showed in her presentation:

- I loved the video GIRL POWER!
- I love the video, I actually felt I was there.
- I liked that we got to see a real movie from space.
- I really liked seeing how things worked in space.
- The video was really cool, and it made me want to go into space.
There were a few negative responses, but these responses mostly referred to the length of the presentation and the speed with which Dr. Magnus spoke:

- It was interesting, but it was kind of long.
- Very cool I liked it but it was a little long!
- She talked too fast.
- She spoke a little too fast but she had some really good [information].

Finally, there were many comments made directly about Dr. Magnus that were extremely positive and seemed to convey that she inspired the girls in one way or another:

- I thought it was rad how we got to see a real NASA person.
- I think it was pretty cool, I always wanted to float in space.
- She is so amazing and is a really positive role model. I wish I could give her a number higher than a # 4 for excellent
- That was really cool to hear from an actual astronaut from NASA. Getting to see someone who had actually been up in outer space.

Overall the girl’s comments were extremely positive, with only a few girls stating slightly negative suggestions. It appears that having a guest speaker such as a woman astronaut was overall very inspiring for the girls.

Workshops

Due to the large number of workshops, each with small numbers of attendees, the analysis of this portion of the evaluation will not look at each workshop individually. Instead the workshops will be treated as an activity as a whole split into two groups: Workshop One and Workshop Two. The workshops presented at the event were as follows: Computer Challenges, Muscle Power, Weathering, Environmental Patrol, Shake Rattle and Role, The Stuff of Life, Stream Sense, Animal Friends, Hands on Biology,
Magical Math, Hands on Health, Bubbles and Waves, Building our World, Plants are Fun, Check it Out, and Chemistry has Solutions.

Most of the girls, 60%, rated Workshop One as excellent, 33% rated it as good, 9% fair, and only 2% thought Workshop One was poor. Interestingly, overall, Workshop Two received higher ratings from the girls than Workshop One. Seventy Six percent of the girls thought Workshop Two was excellent, 15% rated it as good, 8% said it was fair, and 2% thought it was poor. The same workshops were offered in both groups; therefore, difference in the ratings for Workshop One and Workshop Two does not have to do with which workshops were offered. It seems a logical explanation for this discrepancy may lie in the timing of the workshops. That is, perhaps it took both the girls and presenters some time to “warm-up”. Additionally, in cases such as this, presenting the workshops the first time around is often a means to discover what works and what doesn’t in a presentation. Therefore, the presenters had the opportunity to improve or change their presentation the second time around (Table 6).

Table 6: Girl Evaluations Workshop Scores

<table>
<thead>
<tr>
<th></th>
<th>Workshop 1</th>
<th></th>
<th></th>
<th>Workshop 2</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratings</td>
<td>Frequency</td>
<td>Percent</td>
<td>Frequency</td>
<td>Percent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>111</td>
<td>57%</td>
<td>147</td>
<td>76%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>64</td>
<td>33%</td>
<td>28</td>
<td>15%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>17</td>
<td>9%</td>
<td>15</td>
<td>8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor</td>
<td>3</td>
<td>2%</td>
<td>3</td>
<td>2%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>195</td>
<td>100%</td>
<td>193</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 8 girls did not respond to workshop 1 question.
* 10 girls did not respond to workshop 2 question.
The qualitative data for this section of the evaluation did not show the same discrepancy that the quantitative data revealed. The majority of the girl’s comments were extremely positive for both workshops One and Two. If one were to look at only the qualitative portion of the evaluation, it would appear that both workshops (One and Two) were more similar in ratings, rather than what the quantitative portion suggests. There were only a few comments that were negative in nature. Most of the girls discussed the importance of participating in a workshop that offered “hands on” activities:

- Would have liked to do more stuff.
- The experiments were fun!!
- It was fun. I like being on the radio.
- This was really a great class we tore apart a plant.
- I was kind of disappointed because we didn’t get to do anything hands on.
- Lot’s of fun. Everything was soo great. We did a lot of hands on stuff.
- I think it was fun, I loved playing in the water!
- I really liked how we got to use real surgery tools and real cases…
- It was okay…I think they could have been more hands on and a little more social.
- I had fun making splints.
- I thought my creativity was increased because of sculpting the teeth.

Further, there did not seem to be a real trend in which workshops were liked or disliked. It seems that it depended upon the girl’s individual interest within a given area of math and/or science. The comments were varied in terms of which workshops were most liked.

- It was awesome to learn to survive in a storm.
- I loved it radio is going to be a big influence.
- It was cool and all of the plants are beautiful.
- This was really fun. And I got the hang of it. I wanna be a dentist.
- It was fun looking at sculls and learning about mammals.
- I like insects now!!
- It was so cool. Bacteria is awesome.
• I loved making designs. I loved it. 😊
• This was a cool class. It inspired me to take chemistry in high school. I love it.
• I had fun and learned a lot about salmon and fish habitats.
• Great class very fun. Great veterinary volunteer!
• Favorite part was the live creatures.
• The people talked about some interesting things like earthquakes.
• It was cool. I never thought that building roads could be so hard to do.

In sum, the workshops generally received high ratings and positive comments from the girls. Even though there is a some difference in the ratings between workshops one and two, the qualitative data shows that the girls enjoyed both sessions. Consideration for future conferences might include more “hands on” activities within the individual workshops.

Science mall

The science mall was an activity that occurred after the workshop sessions. It consisted of several informational and interactive booths, similar to a science fair. The girls were asked to rate their experience with the science mall and express any comments about their experience they wished to share. The quantitative and qualitative data appeared to be in agreement. The majority of the girls rated the science mall as excellent, and only a few girls rated it as poor (Table 7).

<table>
<thead>
<tr>
<th>Rating</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>116</td>
<td>65%</td>
</tr>
<tr>
<td>Good</td>
<td>54</td>
<td>30%</td>
</tr>
<tr>
<td>Fair</td>
<td>8</td>
<td>5%</td>
</tr>
<tr>
<td>Poor</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>179</td>
<td>100%</td>
</tr>
</tbody>
</table>

* 24 girls did not respond to this question
The most common words used by the girls to describe the science mall were “interesting” and “fun”, suggesting that the girls had an enjoyable experience. The girls also really seemed to enjoy the free things they were given at the science mall. Some comments made by the girls that illustrate this include:

• Very Fun. Lot’s of great stuff also free stuff! Great time to socialize about what you did and what was fun at EYH!
• A lot of the science mall was a lot of fun.
• I thought the things they gave out were fun.
• So many interesting topics and exhibits. Friendly informative speakers.
• Sooooooo cool.
• Very fun and interesting. I liked the free things.

Most of the negative comments discussed how there was not enough time to see all of the booths:

• There wasn’t enough time to eat lunch and look at all of the shops.
• All of the good ones were filled up. But it was a lot of fun.
• We need more time. Great booths.

Though there were a few comments made by the girls that suggested room for improvement, the girls in general found the science mall activities enjoyable: “The science mall was really cool! I learned a lot! This was my favorite thing.”

Closing activity: What’s my line?

The closing activity of the conference was set up like a game show. The girls were given an opportunity to ask different professionals three questions in order to guess their profession. The final portion of the quantitative analysis asked the girls to rate the closing activity. Unlike the other ratings given by the girls, the ratings for this activity
were considerably lower. A little less than half the girls rated it as excellent, a similar number of girls only rated it as good, and 15% rated it as fair or poor (Table 8).

Table 8: Girl Evaluations of Closing Activity

<table>
<thead>
<tr>
<th>Rating</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>73</td>
<td>46%</td>
</tr>
<tr>
<td>Good</td>
<td>59</td>
<td>37%</td>
</tr>
<tr>
<td>Fair</td>
<td>23</td>
<td>15%</td>
</tr>
<tr>
<td>Poor</td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td>159</td>
<td>100%</td>
</tr>
</tbody>
</table>

* 44 girls did not respond to this question

The qualitative data for this item on the evaluation showed similar results. Less than half of the girls seemed to really enjoy the closing activity, a similar number of girls felt that it was “ok”, and quite a few girls either did not like it or gave suggestions on ways to improve it in the future. The major themes presented in the girls comments were:

First, the girls who really seemed to enjoy the closing activity stated that it was “fun” and/or interesting:

- It was interesting and fun.
- Nice game! Funny!
- It was interesting. Thanx for organizing it for us.
- It was cool. Kinda like 20 questions, only more.
- It was fun to guess what people were.
- It was kind of neat because we heard about more jobs.

Though almost half of the girls felt that it was a great activity, there was a significant number who felt that it was “ok”. This is something to consider for future
conferences, because out of all of the activities this one not only got the lowest ratings, but the girls comments also suggest that there is room for improvement:

- Kinda fun.
- It was pretty good kinda fun.
- A good game, but kinda boring.
- It was okay, but I really didn’t get into it.
- It was all right.

Finally, quite a few girls made suggestions for future activities. Many girls discussed that the closing activity was too difficult or confusing. These suggestions can possibly help to discern why this activity had relatively low ratings:

- Interesting but hard to hear. Not as good as the other classes.
- How about “What’s my job”?
- It was ok, but too many people.
- Hard need more clues.
- It was ok. Kids should be the people.
- I liked it. You should make it have more time for questions.
- I think it was too hard to guess the jobs.
- Confusing! I couldn’t follow!
- It was okay, kind of slow having to wait for the right person to say something.
- Don’t do it next time.
- Fun, but long line, tough answers.

Consideration for future conferences might include checking for age appropriateness since quite a few of the girls discussed that it was too difficult and confusing. Or perhaps creating an activity that actively engages all of the girls by placing the girls in teams, rather than involving only a small number of them, could possibly meet the interest of more girls in the future.
Why EYH?

Finally, the girls were asked three open-ended questions that were designed to gather more in-depth data on their personal experience with EYH. First, the girls were asked to discuss why they decided to attend the EYH event. The responses varied, but there were a few that came up several times throughout the analysis. The major themes found during analysis were it was something fun to do; the girls had a previous love for math and/or science; to learn more about math and/or science and its career options; someone had recommended it to them; and the girls had attended EYH in the past and decided to come again because of their previous experience (Table 9).

Table 9: Why Did You Come to EYH?

1. Expectations of fun
2. Existing math/science interest
3. To learn more about math/science careers
4. Recommendation of other
5. Return attendees (enjoyed before)

For example, most of the girls stated they simply thought the conference would be something “fun” to do:

- It sounded fun!
- Because I thought it would be fun to try this out.
- I wanted to have some fun with science.
- I thought it would be fun to do instead of sleeping.
- Because it seemed so interesting and thrilling.

There were also quite a few girls who had a previous interest or “love” for math and/or science, which led to their decision to attend EYH:
Because I loved math and science.
Because I like doing new things and science.
Because I love animals and biology and it’s a great opportunity for girls to explore fields.
I love science and I want to be a pathologist.
I love science but it isn’t my strong point. I came to give it a boost. I was also interested in Sandra Magnus!

Additionally, there were also girls who came to the event to learn more about science and/or math, as well as to learn about career options:

- Because I wanted to learn more about biology.
- To expand my science and math learning!
- I wanted to know what I can do when I am older.
- Because I want to be a P.I. and I thought it would be good for me.
- I came because I’m interested in what I can do when I grow up.
- To learn more!
- I wanted to “Expand my Horizons”!

Some of the girls decided to attend EYH because their mother, friend(s), or teacher had recommended it to them:

- My mom recommended it.
- My mom made me but I’m glad of it.
- My teacher talked about it and me and some friend’s thought it would be cool to try.
- Because it looked fun and people who came here before said it was a lot of fun!
- My friend asked me if I wanted to come.

Finally a few girls stated that they had come in the past and really enjoyed it, which gave them incentive to come again:

- I came last time and enjoyed it.
- Because I went in 6th grade and I liked it.
- I did it in 2001 and had fun.
- Because I thought I could learn new stuff. I came before and it was fun.
- I came before and enjoyed it.
There were many reasons the girls gave for attending the EYH conference, but the majority of the girls came because they thought it would be “fun”, and/or they had a previous interest in math or science. Therefore, in the future one might consider how to draw upon the population of girls who do not fall in the category of having a previous interest.

**Liked least about the conference**

The girls were also asked to comment on what they liked least about the conference. In regard to this question, most of comments pointed to issues of time: Long speeches, time it took to start, and sitting for a length of time as well as scheduling problems (Table 10).

<table>
<thead>
<tr>
<th>Table 10: Liked Least About the Conference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Issues of time</td>
</tr>
<tr>
<td>2. Scheduling problems</td>
</tr>
</tbody>
</table>

Below are some comments that relate to issues of time:

- I did not like sitting for so long.
- Long speeches.
- Too long.
- The speakers talked to long.
- All the time we had to wait for Dr. Magnus’ speech.
- How early it is.
- The long lines to sign in, and to get the T-shirt.

Another concern brought up by the girls referred to scheduling problems:

- I didn’t like that I didn’t get the one class I wanted. I didn’t get any of the four I wanted.
- I didn’t get the first two choices I had.
- There wasn’t much leeway time for if something took extra time.
- I didn’t like that when I went to “check it out” and they put me in a survival thing instead of criminal investigator thing like I said.
Overall, the girls made statements about structural issues, which have a tendency to occur at most large events. However, because there were a significant number of girls who stated that they did not like sitting for long length of time, it might be good to take into consideration how long the girls sit during the speeches, etc.

Most memorable experience

Finally, the girls were asked to share their most memorable or fun experience from the EYH conference. The question was framed in a way for the girls to imagine they were sharing their experience with a friend. There were many different responses to this item on the survey. However, there were a few responses that showed up again and again for this particular question. For example, many of the girls discussed meeting/hearing Dr. Magnus as their most memorable experience; also, many of the individual workshops were highlighted; the science mall was another activity the girls really seemed to enjoy; and finally, a few girls discussed their overall experience with EYH as being the most memorable for them (Table 11).

Table 11: Most Memorable Experience

1. Guest Speaker (Dr. Magnus)
2. Workshops
3. Science Mall
4. Everything
First, meeting a “real life” astronaut seemed to leave a lasting impression on many of the girls:

- I would say that it was so cool that we got to meet a real astronaut. It was like meeting Neal Armstrong. I really want to be an astronaut or rocket scientist.
- I would tell my friends that we got to meet an astronaut and we got really cool stuff! Also that people try to make girls more interested in science and math.
- Probably Dr. Magnus. I thought her movie was real neat.
- “Sandra Magnus was great! I even got to see an awesome video that was made by her and the crew. She answered a lot of questions and she seemed really nice! You should have been there!”

There were also many comments made regarding the individual workshops. The workshops the girls discussed as being the most memorable experience are presented below. These comments were seen throughout the evaluations:

- When I was in workshop 2 and I took apart a model of a body. I got to take out the lung, breast, colon, and kidney. I had a lot of fun doing all of the stuff and now I know I want to be a P.I. for sure.
- I would tell them about the animal “operation” we did on a stuffed dog.
- I got to make a beetle necklace. The necklace is cool looking.
- Stream Sense: It was really fun with the waders. I like the idea of being in water and being dry at the same time.
- At the Expanding Horizon I was in Hands on Health and 2 women showed us how to model a tooth with wax to make it the same proportional size as the other teeth on a whole set of teeth…This conference made me decide to be a dentist!
- I chose Hands on Biology 11H and I’m glad!! During Hands on Biology, I got to hold a cockroach. You would think that it would be gross but it was fun and it was not slimy, just warm. I want to come again!!
- In my Stuff of Life class I got to clone DNA. It was so awesome. Micro-study is so cool. You should have been there. What’s kind of funny is that I never thought bacteria would be cool. All the anti-bacterial stuff is actually bad for us…the isolated DNA looked like snot. Everyone as soon as they saw it said “Yew! It looks like snot”.
- It was really fun to be in Muscle Power. At first I thought I wouldn’t like, but I loved it!
- I would probably tell them about Bubbles and Waves. Because they were super nice and they were a lot of fun.
- When I was in Chemistry has Solutions we had racquetballs and roses. It was really cool. We used a lighted candle on a stick to blow-up balloons and they made a very loud noise. I thought the whole Expanding Your Horizons conference was pretty neat.
Another aspect of the conference that had a significant amount of comments was the Science Mall. As mentioned earlier, most of the girls really enjoyed their Science Mall experience, and the comments that follow illustrate the girl’s positive experience.

- Probably the science mall because all you had to do is walk around and look at all of the cool things people had to offer.
- I would tell her about the science fair and the shops. They were cool and I learned a lot.
- If I were going to tell a friend the best thing about EYH was the science mall. I learned different jobs that involve science. I touched a corn snake, and learned about fish in Humboldt Bay.

Finally, some girls had a hard time narrowing down their most memorable experience to one single event, implying that they had an overall great experience with EYH. Some girls stated that everything about the conference was the most memorable:

- I would not tell only one friend I would tell everyone that, this was the best fieldtrip I’ve been on. I would also tell them what I learned.
- Umm I’m not sure I would probably blurt out everything.
- Everything! At first, I went to a class called Making Our World. Guess who was one of the teachers? Lucy, Mouse’s mom! And we made routes of a freeway and looked at pros and cons of where we would put them. Then we had a snack and went to our second class. There we made animal print casts and played a type of hide-n-seek with radio collars and antenna. We had a science mall thing and we got to go around and look at different displays and projects.
- I really liked the fact that this is something for girls and it shows that women can do all of this stuff too.

The comments made by the girls about their most memorable experience reveal that the conference touched the girls in several ways. The girls were shown career options, new knowledge, and were provided with an opportunity to gain confidence through the medium of math and science. In general, the girls relayed through their comments that EYH made a positive impact on their lives.
Adult Participants

Demographics

The evaluations for the adult participants were organized similarly to that of the girls (with the exception of grade in school). To determine the demographic information for the adult participants, a series of five questions were asked: School name, school location, status, gender, and race/ethnicity. The following section will discuss the outcome of the questions listed above.

Location.
For the 47 adult participants who returned the survey, 17 school locations were listed: Eureka, Arcata, McKinleyville, Crescent City, Hoopa, Redway, Willow Creek, Bayside, Lewiston, Rio Dell, Freshwater, Leggit, Ferndale, Scotia, Kneeland, Trinidad, and Blue Lake. The majority of adults (19%) were affiliated with schools in both Eureka and Arcata, and the least amount of adults (2%) were affiliated with schools in Freshwater, Leggit, Ferndale, Scotia, Kneeland, Trinidad, and Blue Lake.

Status.
Another question asked of the adults was that of their status. The respondents were asked to circle the most appropriate response: Parent, Educator, Other. The majority of the adult participants (72%) were parents, 19% were educators, and 9% indicated that they were both a parent and educator. Further, the majority of the adult participants were female (89%), and only 11% were male (Table 12).
Table 12: Adult Evaluations Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parent</td>
<td>34</td>
<td>72%</td>
</tr>
<tr>
<td>Educator</td>
<td>9</td>
<td>19%</td>
</tr>
<tr>
<td>Parent and Educator</td>
<td>4</td>
<td>9%</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>100%</td>
</tr>
</tbody>
</table>

Race/Ethnicity.
Finally, as suspected due to the geographic location of the conference, as well as the girl responses, 79% of the adult participants were Euro/Caucasian, 17% were Native American, 2% were Asian-American, and 2% indicated they were something “other” than the choices listed (Table 13).

Table 13: Adult Evaluations Race/Ethnicity

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euro-American/Caucasian</td>
<td>37</td>
<td>79%</td>
</tr>
<tr>
<td>Native American</td>
<td>8</td>
<td>17%</td>
</tr>
<tr>
<td>Asian American</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td>47</td>
<td>100%</td>
</tr>
</tbody>
</table>

Conference Evaluation

Recruitment/Marketing

The adult participants were asked a series of questions regarding their experience with EYH. Like the girls evaluations, the first four questions that follow in this analysis were analyzed purely quantitatively. The adults were asked how they heard about the conference; they were given the same options as the girl participants: Teacher, School Counselor, Parent, Friend, News Paper Ad, Classroom Visitor, and Other. The majority
of the adults, (50%), heard about EYH from a source other than what was listed on the evaluation. Forty-five percent heard about the conference from a teacher, and 11% heard about EYH from both a friend and a newspaper ad.

**Recommend conference**

The adults were also asked if they would recommend EYH to a friend. The results to this question were extremely positive: 84% of the adults stated they would absolutely recommend EYH, and only 16% said they would probably recommend EYH to a friend. Though the results for this question were promising, one must also consider the difference in responses from the girls and the adults. Though the majority of the girls (60%) stated they would absolutely recommend EYH to a friend the number is considerably lower than the 84% of adults. There could be a few possible reasons for this difference. First, there were fewer adult participants; therefore, there were fewer opinions to be had. Second, the adults may see the bigger picture of the whole experience, thus seeing the importance of getting girls involved in the math and sciences. Or, perhaps the adults had a better overall experience than the girls. Regardless, it is important to take into account the smaller number of adult participants.

**Pre/Post interest in math/science:**

The last two questions that were looked at purely quantitatively asked the adults about their interest in math/science before the conference, as well as if their interest had increased after the event. The evaluations suggest that the majority of adult participants (81%) already had a previous interest in math/science before the conference, and
attending the conference increased their already present interest. A small number of respondents (2%) did not have any previous interest in math/science, but after attending the conference their interest increased; additionally, 2% of the adults reported to have no previous interest in math/science and did not gain any interest after attending the event. Finally, 15% of the adult participants had a previous interest in math/science, but did not gain any interest after participation (Table 14).

Table 14: Adult Participants Pre/Post Interest in Math/Science

<table>
<thead>
<tr>
<th>Had Interest Before</th>
<th>Gained Interest After</th>
<th>Did Not Gain Interest After</th>
<th>No Interest before Gained Interest After</th>
<th>Did Not Have Interest Before or After</th>
</tr>
</thead>
<tbody>
<tr>
<td>81%</td>
<td>15%</td>
<td>2%</td>
<td>2%</td>
<td></td>
</tr>
</tbody>
</table>

*6 adults did not respond to this question

The adults were asked a series of questions that allowed for additional comments regarding their ratings of the activities. The following analysis will look at those questions. The questions included in this section look at: The program packets and materials, the guest speaker, workshops one and two, the science mall, and the closing activity.

**Program packets and materials**

Like the girls, when the adults signed in at the conference they were given program packets with information about the conference and the workshops they attended. The adults were asked to rate the packets, as well as offer additional comments about them. All of the adults rated the packets as excellent or good (Table 15).
### Table 15: Adult Evaluations Packets and Materials

<table>
<thead>
<tr>
<th>Ratings</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>22</td>
<td>58%</td>
</tr>
<tr>
<td>Good</td>
<td>16</td>
<td>42%</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>100%</td>
</tr>
</tbody>
</table>

*Nine adults did not respond this question*

Unfortunately, only a few adults wrote comments in the space provided, which does not allow for much analysis. Due to the low number of responses it is hard to decipher what the respondents liked in particular about the packets, but here are a few comments that express the general consensus of the quantitative data:

- Very helpful and well organized materials.
- Nicely presented
- I knew where to go and what to expect.

Additionally, a few of the respondents used the space provided to offer suggestions about the conference in general:

- Too many people in the A1 line…
- More time between sessions would be helpful

Finally, only one respondent (of the eight who commented) stated that he/she was, “missing some materials, but I got them at the workshop”. In general the packets and materials seemed to be helpful to the adult participants, and the quantitative results show that the packets were helpful to the adults.

**Guest speaker**

The adult participants were also asked to rate the guest speaker Dr. Sandra Magnus, as well as to provide additional comments about her presentation. Dr. Magnus’
presentation was well liked by all of the adult participants: 91% rated her as excellent and 9% rated her a good. The comments written about Dr. Magnus were equally positive. In fact, many of the comments made by the adults mirrored that of the girls. For example, many of the adults stated that Dr. Magnus’ presentation was “inspirational” and “motivational”:

- Her presentation was astounding. I feel she was inspirational for me.
- Awesome! Very inspirational…made me want to run back to school so I can be an astronaut too!
- What an inspiring speaker, both because of her background and her motivational skills, thanks!
- Motivating to all. Fascinating. Good message to strive for what you desire.
- Really motivational. Really good quality. It set the tone for the entire conference.

Many of the adults also really enjoyed the movie:

- Loved the video! Would have liked to hear her speak longer.
- Awesome! Great role model! I loved the video.
- Ultra cool talk and super interesting video.
- Exciting speaker, riveting video, very great [role] model…

Finally, Dr Magnus seemed to leave a lasting impression on both the girls and the adults, which the following statements illustrate:

- My daughter turned to me after and said, “Now I want to be an astronaut”.
- What a treat! I watched the girl’s faces as Dr. Magnus spoke, and I could tell they loved her information.
- She spoke to the kids not above. I appreciated her advice on going after the dream keeping your eye on the prize.

There were only a few suggestive comments written by the adults that included issues of Dr Magnus speaking slower. A few girls also discussed the need for Dr. Magnus to speak slower. However, because it was not the content that was critiqued, but rather
the delivery, the assumption can be made that her presentation was extremely positive for both the girls and adults.

Workshops

There were five adult workshops at the conference: Striving for Equity, Will She be Ready, Fun and Family, Finding Money for College, and Making Science Fun for Girls. The adult workshops will be looked at collectively as Workshop One and Workshop Two, with the exception of when it is imperative to list a particular workshop title. The adults rated workshops One and Two similarly (Table 16).

<table>
<thead>
<tr>
<th>Ratings</th>
<th>Workshop 1</th>
<th></th>
<th>Percent</th>
<th>Workshop 2</th>
<th></th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td></td>
<td>Frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>20</td>
<td>48%</td>
<td>14</td>
<td>39%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>18</td>
<td>43%</td>
<td>19</td>
<td>53%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fair</td>
<td>4</td>
<td>9%</td>
<td>3</td>
<td>8%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>100%</td>
<td>36</td>
<td>100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*5 adults did not respond to workshop 1 question
*11 adults did not respond to workshop 2 question

The majority of adults enjoyed both sets of workshops, with only a slight difference in numbers. That is, Workshop Two had a slightly lower rating, than Workshop One, with more adults rating it as good rather than excellent. Overall the qualitative data is pretty consistent with the rating scores. The adults had many positive things to say about the workshops in general:

- Very stimulating discussions.
- Great help to begin search for money.
- Great resources given out.
- Good diverse panel with different viewpoints and good ideas.
- Confirmed/reinforced what I do as an educator and parent.
• I really enjoyed the instructors they made learning fun.

There were also some comments made regarding the need for more time:

• Excellent panel of speakers more time for two workshops.
• Very valuable information…More information than time.

Additionally, a few comments made suggested that some of the workshops were not necessarily what the respondents expected. The two workshops that had comments reflecting this were: Making Science Fun for Girls and Will She be Ready.

• Interesting, but I don’t know how it relates to making Science fun for girls? Maybe I was in the wrong room. FH118??
• Wasn’t really what they talked about.
• I didn’t feel the group stuck to the topic, but I enjoyed the panel. (Would have liked more questions from audience than from moderator though).
• Workshop B Will She be Ready): Title didn’t really match content…

Finally, it is important to note that though the workshop “Finding Money for College” had quite a few positive comments there were also a notable amount of negative ones. For example, a few of the participants felt the speaker to be “dry”, even though he offered some valuable information:

• Dry presenter, but valuable information.
• The presenter was very fair, while finances are a consideration, I would have appreciated more coverage on other aspects besides what was given.
• The instructor was boring and was not very informative. He was unable to answer many questions.

In sum, both sets of workshops received generally positive comments; however, there were a few comments that entailed constructive criticism, which is exactly why there was a space provided for comments. According to the comments made by the
participants, future workshop presenters should consider matching the title of the workshop to the content, and offer more interactive presentations.

**Science mall**

The science mall was enjoyed just as much, if not more, by the adult participants as it was by the girls. Sixty-eight percent thought that it was excellent and 32% thought it was good. The comments given by the participants were right in line with the ratings:

- Very exciting exhibits could tell [a] lot of work and enthusiasm of “presenters”.
- Fascinating stuff! I especially liked the snakes and the crawly things. Lot’s of interesting and thought provoking exhibits.
- Great presenters engaging, informative, not over-whelming.
- Great! Very nice, loved the hands on activities.
- Very interesting a wide variety of fields to study and job opportunities.
- It was really cool. Lot’s to do. Lot’s of fun. Information for not only kids but adults.

Though almost all of the comments were positive, there were also a few comments made that offered suggestions, most having to do with time, but also a few that dealt with how the booths were presented:

- Great! I wish I had a little more time to see it. Awesome variety!
- Excellent opportunity. I think if you have the displays listed on the order form, our time would’ve [been] used more efficiently we only saw a few. (We could plan ahead)
- Many interesting booths. Some could be more interactive.
- Great more hands-on would be greater.

Both the girls and adults mentioned issues of time and how they liked the idea of hands-on activities. These two issues might be considered for the next conference, because they were seen over and over again not just for the science mall, but for the workshop activities as well.
Closing activity: What’s my line?

For the last activity the ratings were similar to that of the girl participants. That is, only 26% of the adults rated it as excellent and 48% rated it as good. A significant number (17%) rated it as fair, and 9% rated it as poor. These ratings are considerably lower than any of the other activities (Table 17).

Table 17: Adult Evaluations Closing Activity

<table>
<thead>
<tr>
<th>Rating</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>6</td>
<td>26%</td>
</tr>
<tr>
<td>Good</td>
<td>11</td>
<td>48%</td>
</tr>
<tr>
<td>Fair</td>
<td>4</td>
<td>17%</td>
</tr>
<tr>
<td>Poor</td>
<td>2</td>
<td>9%</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>100%</td>
</tr>
</tbody>
</table>

*24 adults did not respond to this question

However, almost all of the adult comments (with the exception of a few suggestions) were positive. Most of the comments revealed that the adults thought the closing activity was “fun”:

- Had a fun time
- Entertaining- kids had fun.
- Fun! The girls seemed to like it.
- Cute idea, encourage thinking.
- Got the kids involved.

There were only two participants who made suggestions: One suggested that it needed to be better organized, and the other suggested using ten girls from each grade for the activity. The quantitative data suggests that both the girls and adults did not
particularly enjoy the closing activity; therefore, in the future some changes should be made regarding it.

Why EYH?

There were quite a few different reasons why the adult participants chose to attend the conference. However, there were four major themes within the responses, and many of the responses revealed that their daughters were the most significant influence in their decision to attend: The daughter wanted the parent to come, to support/encourage daughter, and to broaden their daughter’s outlook of math and science (Table 18).

Table 18: Why Did You Come to EYH?

1. Daughter asked them to come
2. To support/encourage daughter
3. To expand daughter’s outlook on math/science
4. To increase girls interest in math/science

Quite a few respondents discussed how it was their daughter that asked him/her to come to the conference:

- Daughter’s insistence.
- My daughter brought home the flyer and wanted to come.
- My daughter invited me! School transportation is a plus!
- My daughter wanted me to come.

There were also some participants who came to EYH in order to support or encourage their daughter, for example a few participants wrote:

- To support my daughter and further her preparation for higher education.
- Because I think education is important and I want to encourage my children to have fun and learn.
- My daughter has an interest in science and math and I want to find a way to encourage her.
Finally, many adults mentioned that they wanted to broaden their daughter’s outlook of math and/or science:

- We want our daughter to recognize educational/career opportunities in the sciences.
- To get my daughter interested in math and science fields.
- To broaden my daughter’s outlook on careers in the science field.

There were also a few comments made by educators. The educators discussed the importance of getting girls interested in math and science, which was their main motivating factor in attending. For example one educator wrote, “I’ve brought student groups in the past and they’ve really enjoyed the experience. The conference shows the importance of classroom studies and how that translates to careers and it’s fun”!

**Liked least about the conference**

The majority of adult comments, when asked what they liked least about the conference, referred to issues of time or scheduling difficulties. This seemed to be a major theme throughout all the participants’ evaluations, both the girls and the adults (Table 19).

**Table 19: Liked Least About the Conference**

1. Issues of Time
2. Scheduling difficulties

When it came to issues of time some adults discussed allowing more time for workshops and keeping strict time limits to allow for breaks:

- Workshop times should be 10 min. or so longer.
- Missed snack at conference. Running over keep strict time limits if possible and let people pursue individual questions.
- There was no break for us between workshops B and F which made for a bit of a long morning (with no break for food or bathroom!)…
• Not enough time in workshops missed breads that was ok
• Lunch period too long. Some people travel far; seems time could be organized more effectively.

Another concern discussed was the need to consider those who traveled long distances:

• We came a long distance and could have used an extra hour or two to get here. Can you consider starting at 9:30 or 10 next time?
• No tables to eat lunch at. Some people drive a great distance. It was silly to keep us for a game show in order for students to receive a T-shirt. This could have been done at another time.

Finally, there were a few comments made regarding the individual workshops that warrant consideration:

• The adult workshops didn’t sound as fun as the kid workshops!
• (Workshop B Will She be Ready): Title didn’t quite match content. I expected more practical advice and…philosophy. (Workshop D How to choose a University): The handout was a bit disorganized. Perhaps follow order of sheets in presentation.
• Fun and Family needed more activities for the family.
• I wanted to go to more parent workshops.
• No. B workshop could have got away from so much gender talk (especially of the past).

Considerations for future conferences may include: Allowing more time for workshops, a later start time for those who travel long distances, and more interactive workshops with clear titles. Time is almost always going to be an issue when it comes to big events, and though it is nearly impossible to stay completely on time, perhaps allowing for more flexibility in the schedule could fix this problem.

Most memorable experience

When asked what their most memorable experience was at EYH most of the adults discussed hearing Dr. Magnus speak and there were also some comments made regarding the conference and its goals (Table 20). Overall it appears that Dr. Magnus’s presentation made a lasting impression on all of the participants both young and old.
Table 20: Most Memorable Experience

1. Guest Speaker (Dr. Magnus)
2. Conference goals

For example, many adults discussed how they enjoyed hearing Dr. Magnus speak as well as watching her video:

- It would have to be about Sandra Magnus… it is inspiring to hear about those who reached far enough to grab their dreams.
- The astronaut!! So exciting to meet her and she was a great role model. Also, the video was wonderful I loved the humor!
- Listening to DR. Magnus was fun and entertaining her video was great.
- Listening to Dr. Magnus and watching her video from her mission to the space station was the most exciting and memorable thing I will take away from this experience. I can’t think of a more inspirational role model for women (young and old!) Thank you for bringing her here!

A few comments were also made regarding the conference and its goals:

- The conference is a great resource and support for both children and adults. It got me thinking about how I can help my daughter now and down the line.
- The conference was very moving I love how the women encouraged our young girls to follow their dreams and value their education…Dr. Sandra Magnus, I thought was both fascinating and inspiring…I think you were very generous with the snacks and T-shirts.

Finally, one adult discussed the lasting impact of EYH:

- I plan to convene some friends and their families with a potluck to continue discussion and share info from the workshops. I will first say how exciting the opening presentation was, and motivating and interesting the workshops were. The whole Conference is a great idea, and I can’t wait to bring my other two daughters!

Overall, the adults really enjoyed the guest speaker; therefore one might consider having a guest speaker of similar caliber and enthusiasm in the future. Both the adults and girls seemed to really enjoy the video along with the presentation, which is something to consider, especially for the girls who might have some difficulties sitting for any length of time.
Volunteers

The volunteers were those who volunteered their time with EYH by either recruiting girls to the conference, preparing for the event, or helping the workshop presenters. The 2003 conference had a total of 91 volunteers. Unfortunately only four of the volunteers filled out evaluations. Therefore, the data that is presented in the following pages does not necessarily represent all of volunteers who participated in the conference. However, because the four volunteers took the time to discuss their experience a brief analysis is warranted.

Demographics

The volunteers were asked the following three questions in order to obtain demographic information: Their status, gender, and their ethnic background. Of the three volunteers, who responded to this question, 2 were students and one classified him/herself as other. Two of the volunteers were female and one left that portion of the evaluation blank. All three volunteers were Euro-American.

Conference Evaluation

In addition to demographic questions the volunteers were also asked questions regarding their general experience of volunteering for EYH. This was the first year that all three respondents had volunteered for EYH. Additionally, all three stated that they would volunteer in the future, and all had volunteered their time by assisting workshop presenters.
Informed about the conference

The volunteers were asked if they agreed with the following statement: EYH contacts kept me informed about the conference. Of the three respondents two strongly agreed that their contacts kept them informed and one only agreed. Therefore, the overall rating was good. When asked to comment on this question only one respondent discussed his/her experience, “Reminder e-mail was great! If you hadn’t sent it, I wouldn’t be here!”

Volunteer dinner was helpful for the conference

Prior to the conference a dinner was held for the volunteers in order to acclimate them to EYH. The volunteers were asked if they agreed that the dinner was helpful in orienting them to the needs of the conference. Only one of the respondents attended the dinner, and that respondent agreed with the question; unfortunately he/she did not provide any comments as to how it could have been more helpful. The only respondent who provided comments stated that, “I was unable to attend.”

Potluck dinner

In addition to the volunteer dinner, the volunteers who visited schools to recruit students had a potluck to orient them to the task. The volunteers were asked if the potluck dinner made them feel comfortable about making a school visit. This question was only applicable to one respondent, who stated that she/he agreed. Again, this volunteer did not state how it could be improved. The only volunteer who responded did not attend the potluck.
Matching interests to EYH needs

Next, the volunteers were asked if their interests were matched with the needs of EYH. Two of the three respondents stated that they strongly agreed, and one respondent agreed. The respondent who only agreed wrote, “I’m not really into dentistry but since I wasn’t sure I was coming until last night, so it wasn’t anybody’s fault!” Of the two volunteers who strongly agreed with the statement one wrote, “I’m a botany major and I assisted with the greenhouse workshop. I loved it!” The other respondent did not comment on this question.

Felt connected to the EYH conference team

The EYH contacts, the volunteer dinner, and the potluck were all a means to create an atmosphere in which the volunteers felt connected to the conference team. In order to determine if these attempts were helpful the volunteers were asked if they felt connected to the EYH conference team. Only one of the respondents strongly agreed, and the other two agreed. Something to consider for this evaluation item is that not all of the volunteers, who responded, attended the dinners, which could make an impact on the degree of connectedness that was felt with the conference team. None of the respondents provided any comments regarding this question.

Enjoyed volunteer work

Finally, the volunteers were asked if they enjoyed their volunteer work for the EYH event. All three volunteers stated that they strongly agreed, which implies that they had an overall good experience with the conference. Only one volunteer commented on
the question stating: “I loved it!” The qualitative portion of the evaluation will give a closer look as to why the volunteers decided to volunteer and what they liked the most and the least about the conference.

Like the other evaluations the respondents were asked three open-ended questions regarding their personal experience with the EYH conference. The volunteers were asked why they decided to volunteer, what they liked least about the conference, and what their most memorable experience was. All three of the volunteers responded to the open-ended questions, which will hopefully allow for a greater understanding of their answers to the previous questions.

Volunteer with EYH

First, the volunteers were asked why they decided to volunteer with EYH. One volunteer felt it was her “duty” to get others involved in science: “I am a female science major, so I felt it was my duty! Besides, I want everyone to like science as much as me.” The other volunteer wanted “to become more involved in the community.” When the workshop presenter’s data is reviewed it will be interesting to see if they were involved with EYH for similar reasons.

Liked least about the conference

All of the participants including the girls, adults, volunteers, and presenters were asked what they liked least about the conference. From every group of participants there were comments regarding scheduling problems. For example, one volunteer wrote, “the scheduling mix-up that happened with my second group.” Another volunteer expressed
that “it would be nice to have a few minutes to get to know the presenters before I
brought the girls to the workshop.” Finally, one volunteer said, “many of the young ladies
expressed that they wish we did this every year.”

**Most memorable experience**

When asked to share their most memorable experience with EYH the
volunteers' responses were right in line with other participants. That is, two of the three
discussed the impact of Dr. Sandra Magnus:

- I loved Sandra Magnus’ talk.
- Hearing Dr. Magnus talk. It was really inspiring for me.

Finally, the last response illustrates what EYH is about, and the volunteers
experience was shown to be extremely positive: “It was wonderful to know the girls and
hearing all of their ideas and interests. It is a wonderful feeling to see young ladies
inspired and maintaining a sense of direction for their future. It was great to be a part of
such a wonderful learning experience.”

**Workshop Presenters and Science Mall Exhibitors**

**Demographics**

**Status**
There were 93 workshop presenters who participated in the conference, and 43
presenters completed the evaluation. Ninety-five percent of the presenters were female
and 5% were male. The majority of the presenters were professionals or students, and
only one respondent was a student/professional/educator (Table 21).
Table 21: Presenter/Exhibitor Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>17</td>
<td>40%</td>
</tr>
<tr>
<td>Student</td>
<td>10</td>
<td>23%</td>
</tr>
<tr>
<td>Educator</td>
<td>7</td>
<td>16%</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
<td>12%</td>
</tr>
<tr>
<td>Educator/Professional</td>
<td>3</td>
<td>7%</td>
</tr>
<tr>
<td>Student/Educator/Professional</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>100%</td>
</tr>
</tbody>
</table>

Race/Ethnicity.
As the other respondents stated, the majority, or 86%, of presenters were Euro American/Caucasian, 5% were Hispanic, and 2% were Asian-American, Native American, Asian-American/Euro-American, or “Other” (Table 22).

Table 22: Presenter/Exhibitor Race

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Euro American/Caucasian</td>
<td>36</td>
<td>86%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>Asian American</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Asian American/Euro American</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Native American</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td>42</td>
<td>100%</td>
</tr>
</tbody>
</table>

*1 presenter/exhibitor did not respond to this question

Conference Evaluations

Has volunteered with EYH in the past
The presenters were asked three questions that were analyzed purely quantitatively regarding their experience at the conference. The first of the three questions asked the presenters how many times, including this conference, they had
volunteered with EYH. The responses ranged from 1-6 times. For the majority, a little more than half, of the presenters/exhibitors this EYH conference was the first time they had volunteered. A quarter of the respondents had volunteered once before, and only one respondent had volunteered the past six conferences (Table 23).

Table 23: Times Volunteered for EYH Including 2003

<table>
<thead>
<tr>
<th>Number of times</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>21</td>
<td>51%</td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td>24%</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>10%</td>
</tr>
<tr>
<td>4</td>
<td>3</td>
<td>7%</td>
</tr>
<tr>
<td>5</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100%</td>
</tr>
</tbody>
</table>

* 2 presenters/exhibitors did not answer this question

Willingness to participate in the future

Another question asked was: Would you be willing to participate in a future conference? Almost all of the presenters, 95%, stated that they would be willing to participate in the future, and only 5% stated they would not.

Exhibit classification

Finally, the presenters/exhibitors were asked to classify their session/exhibit. For this question they were asked to write in their response. The table below shows the breakdown of classifications, with the majority of presentations being either oceanography or biology (Table 24).
Table 24: Exhibit Classification

<table>
<thead>
<tr>
<th>Exhibit</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>5</td>
<td>13%</td>
</tr>
<tr>
<td>Oceanography</td>
<td>5</td>
<td>13%</td>
</tr>
<tr>
<td>Medical</td>
<td>4</td>
<td>10%</td>
</tr>
<tr>
<td>Chemistry</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>Computing</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>Geology</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>Muscle Power</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>Zoology</td>
<td>2</td>
<td>5%</td>
</tr>
<tr>
<td>Blood Bank</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Botany</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Earth Science</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Ecology</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Epidemiology</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Forestry</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Home Technology</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Math</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Meteorology</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Natural Resource</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Science</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Veterinarian</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Wildlife</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>100%</td>
</tr>
</tbody>
</table>

* 4 presenters/exhibitors did not respond to this question

Like the other evaluations the presenters/exhibitors were asked a series of questions, which asked them to circle the response they most agreed with, as well as to write additional comments. The following seven questions were set up in this manner.

**Age appropriateness**

First, the presenters/exhibitors were asked if their activities were age-appropriate for the girls who attended. The majority of respondents, 73%, felt strongly that their
session was age appropriate, and only 2% felt that their session was not age appropriate (Table 25).

Table 25: Session Was Age Appropriate

<table>
<thead>
<tr>
<th>Response</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Agree</td>
<td>30</td>
<td>73%</td>
</tr>
<tr>
<td>Agree</td>
<td>10</td>
<td>24%</td>
</tr>
<tr>
<td>Disagree</td>
<td>1</td>
<td>3%</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100%</td>
</tr>
</tbody>
</table>

*2 presenters/exhibitors did not respond to this question*

Unfortunately only four commented on this evaluation item. Two of the comments made suggested that their session was age-appropriate, and the other two seemed to feel that it could have been more so:

- The girls understood the concepts presented.
- The girls understood the content well.
- Next time I’ll have a hands-on activity as well.
- Hard not to use bigger words for them to understand.

Because only a few respondents commented it is hard to discover how they felt they could have improved their presentations (at least those who only agreed). However, the quantitative portion of this question has shown that most of the presenters/exhibitors generally felt their activities to be age-appropriate.

**Girls seemed interested in activities**

Next, the presenters were asked if they agreed with the statement: The participants in my session seemed generally interested. 51% of the presenters strongly
agreed with this statement, 46% agreed, and only 2% disagreed. The few who commented on this item had generally positive things to say:

- One girl asked, if chemistry class was available in high school.
- Most girls asked questions and participated.
- Mealworms were a huge hit.
- Very excited to make a cast of animals.
- 2 pre-arranged volunteer blood donors.

There were also a few respondents who relayed that though not all of the participants showed the same interest, the ones who did seemed to really enjoy the activities:

- The girls who were interested were really interested and enthusiastic.
- Some seemed interested and participated. Others didn’t appear as interested.

The few comments that were written seemed to reflect the quantitative data. That is, most of the comments were positive and showed that the participants were eager to learn and seemed very interested in what they were learning. However, in the future if more hands-on activities were implemented (as suggested by the girls) it could bring higher ratings for this item.

**Room properly equipped**

The third item in this section asked the presenters if they agreed with the following: The room/space was properly equipped for my session. Most of the respondents (69%) strongly agreed with this statement, while 31% only agreed. Most of the comments written regarding this item were positive; with only a few comments expressing difficulties:

- The overhead bulb was out had to borrow from the next room.
- Field house lights were loud.
• Since it was a computer lab, it was locked. We had trouble getting in.

However, the majority of the comments were positive:

• Having a lab room worked well.
• Requested a specific lab because I knew the layout and its accessibility to the stockroom and the chemicals I needed.
• We found a space that worked well, within the nearby areas.
• Thanks for the microscope. It added a lot to the display.
• Great amount of room.

It appears that the few difficulties that occurred could easily be overcome with better communication. Another possible solution would be a room check done by either the presenters or volunteers prior to the conference. It is not unlikely to have at least a few difficulties when organizing a big event, and overall the respondents seemed satisfied with the outcome.

**EYH contacts kept me informed**

When asked if they agreed that the EYH contacts kept them informed about the conference the majority of the presenter/exhibitors (60%) strongly agreed, 46% agreed, and only 2% disagreed. Only two respondents commented on this item stating:

• Barb Peters did a GREAT job!
• Thanks, Leslie.

Though the majority stated in the quantitative portion of the question that they strongly agreed with the statement, it would have been helpful to receive more comments on this item. It is hard to discern what could have been done to improve the information being relayed to the presenters without more information from the respondents.
Contacts supported session needs

Fifth, a high majority (76%) of the presenters/exhibitors strongly agreed with the statement: EYH contacts supported my session needs. Where a quarter, or 24%, only agreed with the statement. It is positive for EYH that all of the respondents at least agreed with the above statement; however, 24% is still a significant number of people who did not strongly agree that their session needs were supported. Due to the few number of written responses it is hard to tell what improvements could be made in the future. Of the four presenters who did respond three were positive and only one discussed a difficulty that occurred.

- Thanks, Leslie
- Supplies were delivered and student help came through.
- Awesome.
- Only complaint was locked door.

Without more information from the respondents it is hard to conclude what could have improved their experience. Hopefully, the open-ended questions will provide more insight as to what improvements can be made for future conferences.

Dinner helpful for conference preparation

Next the respondents were asked if they agreed with the statement: The volunteer dinner was helpful for conference preparation. For the respondents that attended the dinner 69% strongly agreed and 31% agreed with this statement. There were about 15 respondents who stated that the question was not applicable, because they were unable to
attend, and many of the comments written in regard to this question show the high number of respondents that had schedule conflicts with the dinner:

- I missed it! Great idea to hold one, though!
- Couldn’t attend.
- Sorry way too much else going on!
- I am truly sorry I missed it.

However, those who did attend the dinner had positive things to say about it:

- Great food!
- Very helpful for 1st time volunteers.
- I think this year’s session was better than, the two in the past I attended.
- Good info presented, but I was on a tight schedule and would have appreciated starting on time.

In sum, nearly 1/3 of the respondents were unable to attend for one reason or another, which is a pretty high number. Future considerations might include offering a few smaller dinners, so that people with different schedules have the opportunity to attend. The comments from those who were able to attend were positive, which suggests that the general structure and information of the meeting was useful to the presenters and exhibitors.

Enjoyed presenting/exhibiting for the EYH conference

Finally, the presenters/exhibitors were asked to respond to the statement: I enjoyed presenting/exhibiting for the EYH conference. The responses were extremely positive: 85% strongly agreed and 15% agreed. This is the highest rating so far, suggesting that the overall experience was extremely positive. The comments were right in line with the ratings. For example one respondent wrote, “I love this conference! I like to get other people interested, especially girls”. Others wrote:
This was a lot of fun!
It is always great to see the girls get involved and enjoy themselves (and maybe learn something?).
Always hard to connect with this age group. This was the best yet!
So much fun!

The next section will offer a greater explanation as to why the presenters and exhibitors chose to volunteer their time, what they liked least about the conference, as well as a deeper understanding as to why they enjoyed this year’s conference. As with the other evaluations the questions that follow were completely open-ended, with the intention of allowing the respondents to offer their personal experience with EYH.

Why volunteer for EYH?

In hopes of better understanding what motivated the presenters and exhibitors to volunteer at the conference they were asked why they decided to volunteer with EYH. The respondents gave many different reasons; however, there were a few that were seen over and over again (Table 26).

**Table 26: Why Volunteer for EYH**

1. Encourage girls interest in math/science
2. Wanted to share love of math/science with others
3. Support for organization (EYH)

For example, one major motivating factor was to encourage the girl’s interests in math and science:

- I wanted other girls to become more aware of their career possibilities.
- I think it’s important for young girls to see and speak with women in jobs that are not always traditional. To encourage young women into the field of science.
- 10% women in IT professional programs now. 😊
- I feel it is so important to encourage young women to take math and science in school. The girls always seem interested in physical/occupational therapy.
• To encourage young women into the file of science.

Additionally, some presenters were motivated by their personal passion, and simply wanted to share it with the girls:

• Chance to tell kids about engineering.
• Most people think all zookeepers do is clean up poop. It’s nice to show other sides of the job.
• It’s fun. As a biology geek, I like to get other people interested, especially girls.
• It’s a pleasure to share my delight in my profession and to be a female role model for the girls.
• Because I’m an oceanography club member and it was fun to show younger people.
• To educate and share with other girls about my passion.

Finally, some felt that EYH stands for a good cause, and they wanted to support the organization:

• Good cause, positive female role models.
• Because I believe in what it is trying to do.
• It’s a great cause! The girls always seem to have fun and get excited!

The majority of the comments suggest that the two main reasons for volunteering were to encourage the girls’ interest in math and science as well as to share a personal passion of the field. There were also a few respondents that stated they had volunteered in the past and had a good experience, which led them to volunteer again.

Least successful about session

To find out what could be improved for future conferences the presenters and exhibitors were asked what they found to be the least successful about their session. The responses varied, but there were a few themes that fell right in line with responses from the girl and adult participants (Table 27).
Table 27: Least Successful About Session

1. Need for more time  
2. More hands-on activities  
3. Low number of girl participants

For example, many of the comments suggested the need for more time:

- The first speaker running overtime.  
- Would’ve loved to have more time! 😊  
- Too little time for all the girls to see all the booths.  
- Too little time (understandably).

Additionally, some of the presenters felt that they needed to do more hands-on activities;  
the girl and adult participants in their comments also mentioned this:

- Should do more hands on.  
- Could have used slightly more interactive activities.  
- I needed to have more hands-on activities that everyone in the group could do.

Another concern voiced was that of the low number of participants. For example a few presenters wrote:

- The low number of girls.  
- The number of participants. I only had four.  
- A few more participants would have been nice but the one-on-one help was easier with a smaller number.

There were also a few comments made about personal organization, the girls not cooperating, and age appropriateness. However, the majority of the comments involved issues of time and the lack of hands-on activities, which the girls and adults seemed to be in agreement with. Therefore, future considerations should involve dealing with time issues (not enough of it), and having presentations that involve interactive or hands-on activities.
Most memorable experience

Finally, the two major themes that arose from the presenters/exhibitors when asked about their most memorable experience were: Hearing the astronaut speak and the general interest and/or enthusiasm of the girls (Table 28).

Table 28: Most Memorable Experience

1. Guest speaker (Dr. Magnus)
2. Enthusiasm of girls

For example, many of the presenters discussed how much they enjoyed hearing Dr. Magnus:

- Sandra Magnus! Exhilarating!
- That Sandra Magnus was the keynote speaker and she is such a great role model for young women.
- Astronaut is a great speaker!
- The “coolest” thing this time was the presentation by Sandra Magnus. All of the girls were bubbling over with excitement!

Additionally, there were also quite a few comments regarding the girls general interest in the presentations:

- I enjoyed hearing kids say “Oh wow!” when they were successful with the science mall project I had arranged for them.
- The enthusiasm of the girls was exciting.
- All the girls seemed excited to be there.
- That the girls were generally curious about the station.
- The girls really enjoyed seeing and doing experiments and their appreciation was great!
- Girls being amazed and “grossed out” by photos of skin diseases.
- That the girls were asking questions and I enjoyed answering them as if I felt important.
- Girls were very interested and impressionable. It feels great to know that I may have made a difference in their lives.
Finally, there were a few responses regarding the use of a microscope for a
workshop, but the majority of responses relayed that Dr Magnus and the girls’ interest
was the most memorable. It is extremely positive that the workshop presenters felt such a
connection with the girls involved in the conference, and from the girls comments it
appears that the connection was mutual.

Recommendations For Future Conferences

Though there were a few suggestions made for future conferences by many of the
participants there were also many extremely positive comments made regarding their
overall EYH experience, which suggests that the conference as a whole was a big
success. Upon reviewing the data of the girl and adult participants, as well as the
volunteers, presenters, and exhibitors, there are some distinctive themes that appear
consistently throughout the evaluations. It is these themes that will guide the issues to
consider for future conferences. In this section both the girl and adult participants will be
identified as one group: Conference Participants; the volunteers, presenters, and
exhibitors will be identified as another group: Conference Volunteers.

Conference Participants

Maintain packets and materials

Both the girls and adults gave high ratings for the packets and materials. The girls
really seemed to enjoy the free things, and the adults found them to be very informative
and well organized. There were no suggestions made by any of the participants in terms
of improvement; the packets were a well-liked piece of the EYH conference.
Secure another high profile guest speaker/role model

All of the respondents discussed how much they enjoyed Dr. Sandra Magnus. She was an excellent choice for a speaker. The girls and adults found her to be extremely inspiring and interesting. In particular, the participants really enjoyed the video portion of her presentation. The only comments made about Dr. Magnus, that discussed room for improvement, were that she spoke to fast, and a few of the girls mentioned her presentation was a little long. In the future choosing a guest speaker like Dr. Magnus would be a great asset to the conference, also using something like the video, or an activity, to keep the girls attention seems to also be imperative. As seen in the evaluations, Dr. Magnus was an ideal speaker, because her career was exciting and her story was inspiring.

More hands on time for workshops and science mall

Overall the workshops and the science mall received generally high ratings from all of the participants. However, the suggestion that was seen throughout the evaluations was the need for more hands-on activities. Both the girls and adults felt this was lacking in some of the workshops and some of the science mall exhibits; future presenters should keep this in mind when planning their presentations. Another issue brought up by the participants was the need for more time. This issue was seen over and over again in both the participants and the presenter’s evaluations. One way this issue might be resolved is to allow for ten more minutes for each workshop, as well as allowing for more time to
view the science mall exhibits. There may be other time constraints, yet because the lack of time was brought up so often adjustments are worth considering.

**Change closing activity**

Though the closing activity received relatively high or “good” ratings, it was still considerably lower than the other activities at the conference. Because its ratings were considerably lower, it is important to rethink this activity for future conferences. Some reasons for the lower overall rating include: It was confusing for some of the girls, it was slow moving, and it was too difficult for some of the girls to follow. In addition, it did not allow for active participation by all of the girls. Therefore, conference organizers should consider creating a different closing activity. It is also important to keep in mind that by the end of the day attention spans run short, and the girls have already taken in a lot of information throughout the day. A game or activity that allows the girls to work in teams might better hold their interest through engaging participation.

**Conference Volunteers**

Because the presenters/exhibitors and volunteers will be discussed as one group, there is a discrepancy in the questions asked on the evaluations. There were a few questions asked of the presenters/exhibitors that were different than the volunteers. For the purposes of this section, and due to the low number of responses from the volunteers, only the questions that were duplicated from the presenter’s evaluations will be discussed on the part of the volunteers.
Reinforce need for hands-on activities with presenters

The majority of presenters felt that the girls seemed interested in their presentations; however, there were a few comments that suggested that presenters were aware they should have used more hands-on activities. These statements were right in line with the participant’s comments, which suggest the need for more interactive activities in the future.

Conduct room checks

The evaluations show that for the most part the rooms were properly equipped for the workshops. The few difficulties that occurred could be easily remedied through further communication, and room checks prior to the conference.

Use regular emailing updates

The majority agreed that EYH contacts kept them informed; however, there were few comments made regarding this issue. From the comments made it appears that the e-mails were helpful in relaying messages. Organizers should consider regular email updates to volunteers regarding conference development and upcoming meetings.

Publicize dinner early and often

Many of the conference volunteers stated that they were unable to attend the dinner due to busy schedules. Perhaps in the future a few smaller dinners could be offered instead of one large one, in order to work with people’s busy lives. Those who attended the dinner felt that it was beneficial to their experience, which implies that others would benefit from it if they could attend.
Recommendations given by both conference participants and volunteers

This question gave the participants the opportunity to discuss what they would like to see done differently. The majority of the respondents discussed issues of time (not enough of it), as well as taking into consideration those who travel long distances. Further, the girls, in particular, discussed sitting for long lengths of time. As is discussed in the theoretical literature on girls in math and science, active engagement throughout all activities is an ongoing goal upon which to focus. Furthermore, time was also a major theme for the conference volunteers. As mentioned earlier, this was an issue for everyone including the participants. In the future it might be worth considering making the conference a little longer, possibly adding 10 minutes or so to each activity. Finally, many of the presenters suggested using more hands-on activities, which is right in line with the participants comments, so hopefully in the future more hands-on activities will be offered.

Program Evaluation: Methodological Recommendations

Workshop title data

Allowing the participants to write in the names of their workshops on their evaluation forms generated a great deal of missing and confusing data, which in turn created validity issues. Because of the small workshop enrollments, this problem became a non-issue as we aggregated all data for the “Workshop I” session and all data for the “Workshop II” session.
Recommendation.
In the future, if individual workshop level data is desired, accuracy in workshop titles should be ensured by one of the below or other methods:

1. The data should be filled in on the evaluations by organizing staff prior to their dissemination to participants, or;
2. Time should be allocated at the beginning of the conference to instruct participants on entering workshop title information correctly onto their evaluation forms.

Qualitative data costs
A great deal of administrative time was spent entering qualitative data regarding program packets, guest speaker, Workshop I, Workshop II, Science Mall, and Closing Activity. Many of the comments in this section (questions 10-15) were vague (“cool”; “awesome”; “had fun”) and did not substantially add to the quantitative assessment in this section of the evaluation. More specific comments were generated as the participants were asked in general (questions 17 and 18) what they liked least about the conference, as well as what conference memory they would share with a friend. (Similar issues were noted with the presenter and exhibitor quantitative items that also included space for qualitative comments.)

Recommendation.
In the future, eliminate the qualitative data collection for the above participant program items. To generate more nuanced workshop evaluation data, consider using a
different scale (i.e. Agree/Disagree 4 points Likert Scale) and expanding the question set for each workshop to include several dimensions of workshop success such as:

1. Hands-on learning activities helped me learn.
2. The content was interesting.
3. Presenter made me feel comfortable.

For the presenter and exhibitor evaluation form, future evaluations should eliminate the qualitative portions of questions 8-14 and add an additional open-ended question in the last set of questions that requests presenters and exhibitors to address specific issues that generated lower evaluation scores (if any) in the quantitative section.

**Double-barreled questions**

Participant questions 8 and 9 were double barreled in an effort to conserve on space. This of course created validity issues.

**Recommendation.**

As questions 8 and 9 were the only measures approximating any type of longitudinal change, future evaluations should address the double-barrel problem.

**Volunteer evaluation low response rate**

We did not have a good mechanism for disseminating and collecting volunteer evaluation forms; therefore, we received little feedback from that group of program volunteers. They received their t-shirts at the beginning of the conference and did not
necessarily stay the entire program. So at the end, when evaluations were collected, many volunteers had already left.

Recommendation.
Use email to disseminate and collect evaluation data from volunteers.
CHAPTER V
AAUW COMMUNITY ACTION GRANT PROPOSAL

Introduction

The following chapter consists of a grant proposal to the National American Association of University Women for the Community Action Grant fund for the longitudinal study of Expanding Your Horizons. A grant for this project of $7500 was awarded in June of 2004. My contributions to this project included researching different funding sources available for projects that dealt with girls in math and science; the research portion of the proposal such as the literature review, local statistics, and a needs assessment; writing the IRB/Human Subjects proposal; and coordinating the final product, by insuring all of the pieces were in place to mail by the deadline. This portion of my project gave me a first-time experience in grant writing, as well as the process behind it.

1. Abstract

This 2-year project will determine the efficacy of the AAUW Humboldt Branch supported Expanding Your Horizon (EYH) conference held biennially at Humboldt State University in Northern California. The purpose of the conference is to encourage girls to take more math and science in high school by exposing girls to engaging hands on
activities and role models in the areas of science, technology, engineering and mathematics. This conference has been held for over 20 years, yet no study has been completed to determine the impact on girls’ decisions to take math and science in high school. This project will impact girls in a rural, economically disadvantaged area with a high Native American population. The outcomes of the project will be used for the local branch to determine how to best use its resources to support the encouragement of these girls to pursue careers in the math and science areas as well as disseminate the findings for other national EYH sites to use. The proposal requests $9850 with a total of $17,714 in-kind matching support.

2. Project Rationale – Needs Statement

For decades, organizations have designed and implemented interventions to increase the confidence and involvement of girls in Science, Technology, Engineering and Mathematics (STEM) areas. However, there has been little research completed at the longitudinal level that examines program effectiveness, which is needed to determine if such interventions are reaching their goals in promoting female retention in science and math courses.

This project will establish the impact of the biennial Expanding Your Horizons Math and Science conference for middle school girls in the coastal Northern California area. The results of this study will be used to determine if the limited resources in this economically disadvantaged area are being used effectively to impact girls’ decisions to
take additional math and science in high school. Study results will direct future AAUW supported EYH conferences in the area, or provide guidance for identifying other activities that might be more effective. In addition, results from this study may be useful to others sponsoring EYH conferences around the nation.

Even though girls perform as well as boys in science and math, there is a marked loss in interest in STEM areas that occurs in middle school (AAUW 1999: Fennema and Sherman 1978: James and Smith 1985; Schreiber 1984; White 1992). There are many possible causes for this change in interest. Different expectations for girls and boys can lead to gender bias in the classroom (Becker 1981; Eccles-Parsons 1984; Gilbert & Taylor 1991; Kahle 1990; Wilkinson and Marrett 1985). Research has noted the importance of strong female role models in encouraging interest in STEM (Wertheim 1995).

EYH conferences were created to promote and foster interest for girls in the areas of science and math by exposing girls to women role models who are working in STEM areas. Hands on activities are provided to encourage girls who attend to take more math and science in high school so they are prepared to pursue careers in STEM disciplines. Since the first EYH event held in 1976, more than 575,000 6th-12th grade girls and approximately 59,000 parents and educators have attended EYH conferences nationally. In the 2000-2001 school year, there were 100 individual conferences held in 29 states,
reaching 28,000 students. Humboldt State University (HSU) is one of the host sites for EYH.

Currently HSU offers EYH biennially to 300-400 6th through 8th grade girls and approximately 100 of their parents and teachers. The Humboldt AAUW branch provides financial and volunteer support and was the initiator of the first EYH conference in 1982. However, in the past two decades, no effort has been made to track girl’s participation in STEM courses after attending the local conferences. (Little effort has been spent at the national level as well). The Humboldt AAUW branch is considering sponsoring a more intensive program such as “Tech Trek” in lieu of EYH. Expanding Your Horizons conferences are time and labor intensive, but serve many girls, involving more than 200 volunteers for a relatively low cost of $20/girl. More intensive programs such as “Tech Trek” cost approximately $500 per girl. Corporate sponsorship is very limited in this remote and economically disadvantaged area of Northern California, so a Humboldt AAUW sponsored Tech Trek would reach fewer girls. The outcomes of this project would provide direction for resource allocation for the best intervention for the unique rural population of Northern California.

This project will serve a low-economic rural community that has one of the largest Native American populations in California outside of Los Angeles (U.S. Census 2000). The majority of the girls who attend the EYH conferences at HSU come from Humboldt and Trinity Counties. Both of these counties are rural northern California
communities approximately six driving hours north of San Francisco. The geographic location cuts off both of these counties from many of the resources and opportunities found in other communities that are more connected to urban areas of California.

Due the high Native American population in the community, the Native American girls who attend the local EYH conference will be a group of particular interest when evaluating the program and its effectiveness. Within the Humboldt County public school system (K – 12th grade) 12% are Native American (Humboldt Office of Education 2002-2003). At the last conference in spring 2003, the Native American attendance level was the highest of all the minority groups who attended (at 18%).

Our primary research concern is whether or not the local EYH conferences are affecting the choices of middle school girls to take math and science courses at the high school level. Research has shown that decisions made by girls during their middle school years, concerning career decisions and attitudes about math and science, affect young women’s persistence and involvement in advanced coursework during their high school years (Catsambis 1994). This finding suggests that there is a need for intervention at the middle school level, which is the age group the local EYH conferences cater to. This project will reach girls who have attended the EYH conferences in the spring of 2001 and 2003. The girls who will be contacted will be in 8th-12th grade.

In addition to evaluating the local conference’s effectiveness in general, we will also direct our research towards looking for differences in the program’s effectiveness for
the minority and Caucasian girls within the community. Through this evaluation process the strengths and weaknesses of the EYH conferences will be recognized, which will allow for program changes to be made at the local as well as national level.

3. Planning/Coalition Building Process

This project leverages a coalition between the Humboldt AAUW Branch, Humboldt State University, and Arcata, Eureka and Hoopa High Schools. Approximately 45% of EYH participants eventually matriculate into one of these three high schools. Girls from the 3 middle schools with the highest number of EYH attendees attend Arcata High School. Hoopa High School, located one hour east of Humboldt State University has a significant population of Native American girls, as it is the high school for the Hoopa Reservation. Each EYH conference has had up to 25 girls from Hoopa attend the conference. Assessing the impact of the conference on this population is important as Native Americans as well as women are severely underrepresented in STEM areas.

The first year of the project will involve three key planning areas: 1) confirming project steps and responsibilities with coalition members; 2) developing evaluation instruments, securing human subjects research approval, and training research staff; and 3) working with high school contacts to outline the components of a database that would

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1 Planning timeline is incorporated into the overall project timeline in Section 5 below.
aggregate data on coalition high school girls regarding math and science enrollment. These activities will be facilitated by HSU faculty project directors and graduate students. We have received commitments\textsuperscript{2} from high school principals and/or counselors at all three area high schools. In addition, we plan to involve three past EYH participants in the planning phase of the project. Through a series of meetings, coalition members and girls will be asked to provide feedback on evaluation methods and instruments. High School counselors will be central liaisons to existing data on girls needed for the project database, and will provide assistance with contacting a random sample of non-EYH high school girls for follow-up data collection.

4. Project Description – Anticipated Outcomes

We propose a longitudinal evaluation of the Humboldt State University “Expanding Your Horizons” (EYH) conferences. The project will include the design, data collection, analysis and reporting of data evaluating the effectiveness of EYH in meeting the key conference objective of increasing girls’ interest and enrollment in high school math and science courses.

We have access to contact information for 650 girls who participated in EYH conferences during Spring 2001 and 2003. As the Humboldt State University EYH conference targets 6\textsuperscript{th} – 8\textsuperscript{th} grade girls, most of the past participants from these conference

\textsuperscript{2} Following the advice of the AAUW Educational Foundation Associate, Organizational Summary/Commitment Forms are not provided for project partners as partners are providing in-kind support that is documented in the budget.
years will be in high school, enabling us to collect follow-up data regarding their math and science course enrollments. We will compare enrollment patterns and science/math decision making processes between EYH past participants and a comparison group of girls who did not attend EYH. This type of design that compares EYH and non-EYH participants will allow us to make methodologically sound statements about outcomes regarding EYH impact.

Sample design

We will use three samples of girls for collecting data: 1) girls who attended EYH conferences in 2001 and 2003, 2) girls who have not attended EYH conferences, and 3) a subsample of the girls who attended the conferences in 2001 and 2003 for focus group interviews. Working with school counselors, we will aggregate existing data on the science and math enrollment patterns of the full-population of EYH and non-EYH girls at the 3 partner high schools.

We will also include a subsample of approximately 80 girls in 12 focus groups of 6-8 girls each. There will be three types of focus groups based on race (Caucasian, Native American, and Latina) for both EYH and comparison populations.

We will collect additional survey data from a stratified random sample of 300 EYH and comparison group girls. We will over sample on girls from Native American and other minority communities.
Data collection methods

Girls will be sent letters soliciting their participation in the study. To participate, girls will need to return a letter signed by a parent or guardian providing consent. To entice involvement, we will enter participants in a raffle for a series of prizes such as books, gift certificates, science kits, t-shirts and a computer. This raffle will be held during an evening ice cream social at HSU, to which all participants and their parents will be invited. Our EYH experience tells us that raffles are successful for generating excitement among the girls. The social will include AAUW members who will present information about their careers in STEM areas.

Graduate research assistants working with high school counselors to extract needed information from existing school databases will compile the full-population database. Focus groups will solicit, through open-ended questions, attitudinal information about science and math coursework and careers as well as decision-making processes regarding science and math coursework and career plans. Focus groups will be tape-recorded and led by Faculty Project Directors assisted by graduate research assistants. Data provided by the girls through focus groups will also help shape questionnaire design.

Questionnaires will be developed during the planning phase of the project. In addition to demographic information, these questionnaires will solicit the following information primarily through close-ended questions: 1) attitudinal information about
science and math coursework and careers; 2) past and anticipated science/math course enrollment; 3) decision making processes regarding science and math coursework; and 4) future career plans. Graduate research assistants will administer questionnaires via the phone and mail.

Informed consent

Human Subjects Research Approval will be obtained from the HSU Graduate School during the planning stage in year one of the project.

Data analysis

All data will be compiled and analyzed using resources in the Sociology Data Analysis Lab. SPSS software will be used with quantitative (survey) data. NVivo software will be used with qualitative (focus group) data.

5. Implementation Plan

Table 1 below describes the timeline for implementation plan. Please note that the project-planning schedule is provided in Table 1 as well.
Table 29: Project Planning and Implementation Timeline.

<table>
<thead>
<tr>
<th>Period</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>July – September, 2004</td>
<td>• Develop Draft Instruments and Submit Human Subjects Research Proposal</td>
</tr>
<tr>
<td></td>
<td>• Hire Research Assistants</td>
</tr>
<tr>
<td></td>
<td>• Solicit 3 Past EYH Girls to Participate</td>
</tr>
<tr>
<td>October – December, 2004</td>
<td>• Meet with Partners from Schools and Clarify Tasks</td>
</tr>
<tr>
<td></td>
<td>• Develop Sampling Method</td>
</tr>
<tr>
<td></td>
<td>• Design Project Web Site</td>
</tr>
<tr>
<td>January – March, 2005</td>
<td>• Pilot Focus Group</td>
</tr>
<tr>
<td></td>
<td>• Refine Focus Group Guide</td>
</tr>
<tr>
<td></td>
<td>• Work with Counselors to Compile Course Enrollment Data for EYH and Comparison Group Girls</td>
</tr>
<tr>
<td>April – June, 2005</td>
<td>• Analyze Population Data on Course Enrollment</td>
</tr>
<tr>
<td></td>
<td>• Draft Letters to Girls and Parents</td>
</tr>
<tr>
<td>July – September, 2005</td>
<td>• Secure Questionnaire Sample Through Parental Permission Letters</td>
</tr>
<tr>
<td></td>
<td>• Conduct Focus Groups</td>
</tr>
<tr>
<td>October – December, 2005</td>
<td>• Transcribe And Analyze Focus Groups</td>
</tr>
<tr>
<td></td>
<td>• Refine Questionnaires Based on Girls Input and Focus Groups</td>
</tr>
<tr>
<td></td>
<td>• Administer Questionnaires</td>
</tr>
<tr>
<td>January – March, 2006</td>
<td>• Analyze Questionnaire Data</td>
</tr>
<tr>
<td></td>
<td>• Write Reports</td>
</tr>
<tr>
<td>April – June, 2006</td>
<td>• Present Study Findings at Conferences</td>
</tr>
<tr>
<td></td>
<td>• Publicize Web Site and Study Findings</td>
</tr>
</tbody>
</table>

6. Evaluation Plan

We are proposing an overall evaluation project. Nevertheless, we will incorporate into the final evaluation report an assessment of research and evaluation design and recommendations for methodological considerations on future evaluation projects.
7. Dissemination Plan

Data from this evaluation project will be presented in local, regional and national forums including: AAUW Branch and State Newsletters and Meetings, American Sociological Association, Pacific Sociological Association, Society for Applied Sociology, and the American Society for Engineering Education and possibly the National Science Teachers Association.

In addition, project directors will develop and publicize a project web site. The site will make available both evaluation design and implementation updates, as well as evaluation reports. Projects directors will work with the AAUW and the HSU public relations office to send out press releases to appropriate news and professional organization publications. Project directors will also submit for publication articles based on the evaluation project to appropriate peer-reviewed journals.

8. Impact/Outreach

This evaluation project will inform the organization and planning of programs that address Northern California girls’ interest and enrollment in high school math and science courses. AAUW in partnership with Humboldt State University faculty and area high schools will use evaluation results to inform the offerings of the “Expanding Your Horizons” conference, and consider additional or alternative methods for engaging girls in these fields during high school. Given the large Native American population of Humboldt and Trinity Counties, particular attention will be placed on considering
program effectiveness for girls from these communities. In addition, other EYH sites around the nation, as well as the national EYH office should find the results useful for future EYH conference offerings.

The project directors, both AAUW members, will use data from this AAUW funded evaluation to prepare a National Science Foundation or other appropriate funding agency proposal for a long-term longitudinal study comparing EYH and other programs.

9. Qualifications of Project Directors

Mary Virnoche is an Assistant Professor in the Department of Sociology at Humboldt State University and coordinates the Master’s Program in Practicing Sociology, which offers a specialization in Program Evaluation. She works in the fields of science and technology studies and gender. Dr. Virnoche has generated $1.8 million in project funds since 1996 including $660,000 in direct grant funding and $1.147 million in cash and in-kind matching funding. Her past grant projects have included the development, research and evaluation of K-12 teacher technology training and other digital divide work. She worked with AAUW on the evaluation of the Spring 2003 EYH conference and officially joined AAUW in 2003. She will direct the evaluation.

Elizabeth A. Eschenbach is an Associate Professor and Department Chair of the Environmental Resources Engineering Department at Humboldt State University. Dr. Eschenbach has been an AAUW member since 1995, where she has served as the chair of the Equity in Education committee since 1996. Dr. Eschenbach has assisted in the
organization of EYH conferences since graduate school in 1989 and has served as the
Chair of the EYH Organizing Committee at Humboldt State University since 1999. Her
research interests lie in the areas of equity in engineering education, engineering
education and water resources systems engineering.

10. Organizational Capacity

AAUW members Mary Virnoche, Ph.D. and Elizabeth A. Eschenbach, PhD, will
direct the project. The Humboldt Branch of AAUW has supported Expanding Your
Horizons Conferences at Humboldt State University since they first began in the early
80s. The branch will manage the finances of the project, while the project directors will
manage the project itself. The branch will use its current methods and resources to
manage the funds. The project leaders have much experience in managing similar
projects as explained above and provided in their attached vitae. Dissemination activities
at the local, state and national level will provide additional visibility for AAUW. This
visibility will lead to growth of AAUW.
## Budget

<table>
<thead>
<tr>
<th>EXPENSE ITEMS</th>
<th>Community Action Grant Request</th>
<th>Other Funds</th>
<th>In-Kind Contributions</th>
<th>Total Amount Required</th>
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<td><strong>Salary, Wages &amp; Benefits</strong></td>
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<td></td>
</tr>
<tr>
<td>Project Director I -- (In-Kind HSU)</td>
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<td></td>
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<td>$8560</td>
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<tr>
<td>Project Director II -- (In-Kind HSU)</td>
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<td>School Counselors Stipend</td>
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<td><strong>Travel</strong></td>
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<td></td>
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<td>Hoopa Counselor mileage for planning meetings:</td>
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<tr>
<td>Research Team mileage to Hoopa for focus groups:</td>
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<td>Bus and driver for Hoopa Girls to travel to Ice Cream Social:</td>
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<td>Graduate Research Assistant travel to Hoopa and Eureka to work with counselors on existing data aggregation:</td>
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<td><strong>Other</strong></td>
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<td>Digital Voice Recorder -- Olympus DS330 = $150</td>
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<td>Postage</td>
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<tr>
<td>Copying</td>
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<tr>
<td>Food</td>
<td></td>
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<td>$520</td>
<td>$520</td>
</tr>
<tr>
<td>Incentives for Research Participation –Other Funds from AAUW and local businesses $200.</td>
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<td>$800</td>
<td>$1000</td>
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<tr>
<td>Local and Long-Distance Phone – (In-Kind HSU).</td>
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<tr>
<td>Web Space (In-Kind HSU).</td>
<td></td>
<td></td>
<td>$240</td>
<td>$240</td>
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<tr>
<td><strong>Totals</strong></td>
<td>$9850</td>
<td>$200</td>
<td>$17,714</td>
<td>$27,764</td>
</tr>
</tbody>
</table>
Budget Narrative

More than 75% of the budget will be spent in Year II.

Salary, wages & benefits

- **Project Director I** -- Dr. Virnoche will direct the evaluation planning and implementation. She will supervise Sociology graduate research assistants specializing in program evaluation. She will also serve as the central liaison to high school partners. $29/hour * 10 hours per month * 12 * 2 years = $6960 * 1.23 (fringe benefits allocation) = $8560 (In-Kind HSU)

- **Project Director II** -- Dr. Eschenbach will help facilitate project planning and implementation. She will also develop and maintain the project web site, and work with Dr. Virnoche on writing final reports and articles. She will serve as the central liaison to the local AAUW branch. $44/hour * 5 hours per month * 12 * 2 years = $5280 * 1.23 (fringe benefits allocation) = $6494 (In-Kind HSU)

- **Graduate Research Assistants** – Will assist with research design, data collection, data entry, data analysis, report writing and miscellaneous administrative needs. GRAs will average a total of 10-15 hours per week. The majority of these hours will be accumulated in year two of the project when intensive data collection and analysis work will be completed. 650 hours @ $10/hour = $6500

- **School Counselors** – We will provide each school counselor with a stipend of $300 for helping us to access and aggregate existing data on girls enrollment in science and math classes, and also for helping us contact girls for participation in focus groups and surveys.

Travel

- Hoopa Counselor mileage for planning meetings: 50 miles roundtrip * .31/mile = $15.50 * 4 trips = $62; Research Team mileage to Hoopa for focus groups: 50 miles roundtrip * .31/mile = $15.50 * 4 trips = $62; Bus and driver for Hoopa Girls to travel to Ice Cream Social: $250 based on past EYH expense reports; Graduate Research Assistant travel to Hoopa and Eureka to work with counselors on existing data aggregation: 250 miles * .31 = $78. Total Travel = 62 + 62 + 250 + 78 = $452
Other

- **Digital Voice Recorder** -- Olympus DS330 = $150
- **Postage** – Return postage on parental permission letters: 300 * .37 = $111; postage for questionnaires and follow up mailings for girls who cannot be reached by phone: 100 * .37 = $37. mailings to girls for focus groups: 80 * .37 = 30. Total Postage = $111 + 37 + 30 = $178
- **Copying** – 10 copies/girl * 300 * .05 = 150; reports for dissemination 40 * 100 * .05 = $200. Total = $200 + 150 = $350.
- **Food** – Focus Groups: $20 each * 12 = $240; Planning Meetings with counselors: $20 each * 4 = $80; Ice Cream Social: $200. Total Food = $520
- **Incentives for Research Participation** – Girls participating in the evaluation study will be entered in a drawing for prizes to be held at the ice cream social. Prizes will include a computer ($500), books ($100), science kits and software ($100) and gift certificates ($100): $800 request. We will also solicit donations of prizes such as SCARF books from a previous AAUW branch project to identify books with Successful Courageous and Resources Females: Other Funds from AAUW and local businesses who have supported EYH: $200. Total Incentives: $1000.
- **Facilities Lease** – Social, Focus Groups, Data Analysis Lab and Computing Facilities $2000 (In-Kind HSU).
- **Local and Long-Distance Phone** – Commercial Rate = $25/month * 24 = $120; $300 long distance. Total Phone = $420 (In-Kind HSU).
- **Web Space**-- Commercial Rate = $10/month * 24 = $240 (In-Kind HSU). The web page will remain available after the completion of the project
CHAPTER VI:
COLLABORATIVE INQUIRY GRANT

Introduction

The following chapter includes a grant proposal for the Humboldt State Collaborative Inquiry grant fund, which was awarded in August of 2004 for $500. After gaining experience with the AAUW grant proposal we decided to take on this mini grant opportunity to subsidize the larger grant. Because we had already completed the other proposal this process was much easier. That is, we had already completed much of the research and work for the previous grant, which allowed us to incorporate that information into this new proposal. For this project my job was to write the proposal.

Center for Educational Excellence, Collaboration & Inquiry

Proposal Title: Do EYH Girls Take More Math & Science?

1. Names and Contact Information: Collaborative Inquiry Team
   A) Project Director: Mary Virnoche, Ph.D. Assistant Professor in the Department of Sociology at Humboldt State University.
   B) Project Director: Elizabeth Eschenbach, Ph.D. Associate Professor and Department Chair of the Environmental Resources Engineering Department at Humboldt State University.
C) *Eureka High School Contact:* Principal 

D) *Arcata High School Contact:* Vice Principal 

E) *Hoopa High School Contact:* Counselor 

F) *Three High School Girls (one from each high school) will join the team and are yet to be identified.* 

2. Description of Project, Time-Line, Data Gathering, and Analysis Plan

*Project Description*

This 2-year project will determine the efficacy of the AAUW Humboldt Branch supported Expanding Your Horizons (EYH) conference held biennially at Humboldt State University in Northern California. The purpose of the conference is to encourage girls to take more math and science in high school by exposing girls to engaging hands-on activities and role models in the areas of science, technology, engineering and mathematics. This conference has been held for over 20 years, yet no study has been completed to determine the impact on girls’ decisions to take math and science in high school. This project will impact girls in a rural, economically disadvantaged areas with a high Native American population. The outcomes of the project will be used for the local branch to determine how to best use its resources to support the encouragement of these girls to pursue careers in the math and science areas as well as disseminate the findings for other national EYH sites to use. The primary research question is: How does attendance at EYH conferences affect girls’ math and science course choices in high
school? The secondary question is: How does race affect program effectiveness?

**Project time-line**

<table>
<thead>
<tr>
<th>Year</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fall 2004</strong></td>
<td>Meet with high school contacts to discuss: Full population data organization and possible processes for extracting data in Fall 2005. Mechanisms for parental consent for questionnaires and focus groups.</td>
</tr>
<tr>
<td><strong>Winter 2005</strong></td>
<td>Preliminary focus group of three girls who attended EYH conferences</td>
</tr>
<tr>
<td></td>
<td>• Solicit three girls to consult with research</td>
</tr>
<tr>
<td></td>
<td>• Pilot focus group- refine focus group guide</td>
</tr>
<tr>
<td><strong>Spring 2005</strong></td>
<td>Conduct focus groups (10 total)</td>
</tr>
<tr>
<td></td>
<td>• EYH Attendees: two groups of white girls, two groups of Native American girls</td>
</tr>
<tr>
<td></td>
<td>• EYH Non-Attendees: two groups of white girls, two groups of Native American girls, two groups of Latina girls</td>
</tr>
<tr>
<td></td>
<td>Use focus group responses as an aid in refining the questionnaires</td>
</tr>
<tr>
<td><strong>Fall 2005</strong></td>
<td>Full Population Database extraction (data obtained from partnering schools) Survey: Administer questionnaires via phone and mail</td>
</tr>
<tr>
<td><strong>Winter 2006</strong></td>
<td>Data Analysis</td>
</tr>
<tr>
<td></td>
<td>• SPSS and NVivo software programs</td>
</tr>
<tr>
<td></td>
<td>Write Report</td>
</tr>
<tr>
<td><strong>Spring 2006</strong></td>
<td>Report findings and present findings at conferences</td>
</tr>
</tbody>
</table>

**Data Gathering**

Girls will be sent letters soliciting their participation in the study. To participate, girls will need to return a letter signed by a parent or guardian providing consent. To entice involvement, we will enter participants in a raffle for a series of prizes such as books, gift certificates, science kits, t-shirts and a computer. Research for this project will include focus groups and questionnaires.

The focus groups will solicit, through open-ended questions, attitudinal information about science and math coursework and careers as well as decision-making processes regarding science and math coursework and career plans. Focus groups will be tape-recorded and led by Faculty Project Directors assisted by graduate research assistants.
Data provided by the girls through focus groups will also help shape questionnaire design. The questionnaires will be developed during the planning phase of the project. In addition to demographic information, these questionnaires will solicit the following information primarily through close-ended questions: 1) attitudinal information about science and math coursework and careers; 2) past and anticipated science/math course enrollment; 3) decision making processes regarding science and math coursework; and 4) future career plans. Graduate research assistants will administer questionnaires via the phone and mail.

Full-population data will be compiled with the help of high school staff extracting data from existing school databases. (Note: the funds requested through this grant will help us compensate authorized school staff designated to assist with this aspect of data collection.)

Analysis plan

All data will be analyzed using resources in the Sociology Data Analysis Lab. SPSS software will be used to analyze quantitative (survey) data. NVivo software will be used to analyze qualitative (focus group) data. We will compare enrollment patterns and science/math decision-making processes between past participants EYH and a comparison group of girls who did not attend EYH. We will also explore differences in decision-making processes and enrollment outcomes between ethnic groups.
3. Explanation of Significance and Benefits

This evaluation project will inform the organization and planning of programs that address Northern California girls’ interest and enrollment in high school math and science courses. AAUW in partnership with Humboldt State University faculty and area high schools will use evaluation results to inform the offerings of the “Expanding Your Horizons” conference, and consider additional or alternative methods for engaging girls in these fields during high school. Given the large Native American population of Humboldt and Trinity Counties, particular attention will be placed on considering program effectiveness for girls from these communities. The national AAUW office provided a majority of the funds needed for this project. The national office has indicated that they will consider study outcomes in making future EYH funding decisions.

4. Dissemination Plan

Data from this evaluation project will be presented in local, regional and national forums including: AAUW Branch and State Newsletters and Meetings, American Sociological Association, Pacific Sociological Association, Society for Applied Sociology, and the American Society for Engineering Education and possibly the National Science Teachers Association.

In addition, project directors will develop and publicize a project web site. The site will make available both evaluation design and implementation updates, as well as evaluation reports. Projects directors will work with the AAUW and the HSU public
relations office to send out press releases to appropriate news and professional
organization publications. Project directors will also submit for publication articles based
on the evaluation project to appropriate peer-reviewed journals. Findings will also be
presented at various campus forums, as well as to the community forum of the Practicing
Sociology MA advisory board.

5. Project Budget

The grant funding requested here will pay Eureka, Arcata, and Hoopa High School
staff to work with HSU research staff in securely extracting population data for their
schools without jeopardizing student privacy rights. We request $500.00 and anticipate
dividing the grant equally among staff at each of the three high schools ($165.00 each).
Staff consultants are yet to be identified.

6. Human Subjects

Human subjects approval has already been secured. Approval Number 04-04:
Expanding Your Horizons Evaluation
CHAPTER VII: DISCUSSION

This project began as an evaluation of a single conference, and its findings were consistent with much of the literature: Girls enjoyed the guest speaker, who acted not only as a role model, but showed them a non-traditional female career option. They also liked the hands-on activities and the connections made to their lives and future careers.

The evaluation brought about my work to develop a proposal for a longitudinal evaluation of conference outcomes: Did the conference make a lasting difference in girl’s decisions around math and science course taking? Though I did not see the longitudinal study through to completion, my participation in its design and early implementation helped me to recognize the value of the study. Without such a study it is virtually impossible to examine whether the interventions being made by the EYH conferences are actually making a difference in the girls individual lives.

The literature suggested that some of the themes for explaining female persistence in math and science include perceived ability, interest/utility, structural factors, pedagogy, positive social interactions, and non-stereotypical career images. The EYH conferences attempted to target most, if not all, of these themes through their one-day intensive program. For example, parents and teachers are encouraged to attend, while girls are surrounded by their peers throughout the day. They also include a guest speaker...
to inspire girls to enter non-traditional female occupations. Additionally, they provide many hands-on activities allowing girls to make the real-world connections emphasized in the literature. Finally, female community members in STEM occupational fields participate in the conference to show the girls all the career options available to them in those fields of study. All of these activities take place allowing girls to have a positive experience with math and science, and through this positive experience it is hoped that new interests and confidence will arise in the participants.

Additionally, the longitudinal study can also be understood as an intervention aimed at the organizational level of social participation (Straus 1984). That is, though the end result would hope to impact increasing female participation in STEM areas, the actual target for intervention is the organization, The Math and Science Network, which puts on the EYH conferences. Again, briefly going back to Straus’s (1984) model of Social Participation, one can see how the different levels are connected. That is, the longitudinal study’s target is aimed at EYH, but the findings directly impact the individual participants who attend the conferences.

The application of the theoretical knowledge, surrounding female participation in math and science, with interventions such as EYH and the longitudinal study are extremely important in creating and maintaining social interventions. Using one without
the other does not take into consideration the dynamic process by which social interaction occurs. Therefore, in creating interventions that foster female participation in math and science it is key to allow the theoretical knowledge (which is constantly changing) to be a guide in the way the interventions are designed. This project has allowed me to explore reasons why there is a lack of female participation in math and science, as well as to be a part of the intervention process for changing the definition of a situation.
CHAPTER VIII
REFERENCES AND APPENDICES

References


Appendix A:
Expanding Your Horizons Evaluation Question: Student, Adult, and Presenter

2003 EXPANDING YOUR HORIZONS CONFERENCE EVALUATION
STUDENT PARTICIPANTS

Tell us how to make EYH 2005 better and pick up an awesome T-Shirt. Just complete this form and bring it to the West Gym at the end of the day. To protect your anonymity, please do not write your name anywhere on this form.

1. Your School Name: ____________________ 2. School Location (city/town): ______________

3. Your Grade in School: ___________ 4. Gender Female Male

5. Ethnic background: African-American Asian-American Euro-American/Caucasian (You may circle more than one.) Hispanic Native American Other __________________

6. How did you hear about the conference? (Circle all that apply.)
Teacher School Counselor Parent Friend Newspaper Ad Newspaper Article Classroom Visitor
Other _________

Circle a response that best reflects how you feel about each statement below.

7. I would recommend EYH to my friends. Absolutely Probably Probably Not Absolutely
Not

8. I was interested in math and/or science before coming to EYH. Strongly Agree Agree Disagree Strongly
Disagree

9. I am more interested in math and/or science because of EYH. Strongly Agree Agree Disagree Strongly
Disagree

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<tr>
<th>10. Program Packets &amp; Workshop Materials</th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
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<tbody>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
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</tbody>
</table>

11. Special Guest Speaker: Dr. Sandra Magnus, NASA Astronaut

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<tr>
<th>12. Workshop I Number</th>
<th>Title</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
</table>

| Comments: |

13. Workshop II Number | Title | 4 | 3 | 2 | 1 |
|-----------------------|-------|---|---|---|---|

| Comments: |

14. Science Mall

<table>
<thead>
<tr>
<th>15. Closing Activity: What’s My Line?</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
</table>

| Comments: |

Circle a rating for each topic listed below and write additional comments in the space provided.

16. Why did you decide to come to EYH?
17. What did you like least about the conference?
18. If you were telling a friend about something memorable or fun that happened to you at the conference, what would it be? (Use the back of this form to tell us your story).
2003 EXPANDING YOUR HORIZONS CONFERENCE EVALUATION
ADULT PARTICIPANTS

Tell us how to make EYH 2005 better and pick up your conference T-Shirt. Just complete this form and bring it to the West Gym at the end of the day. To protect your anonymity, please do not write your name anywhere on this form.

1. Associated School Name: ____________________  
2. School Location (city/town): ________________

3. Your Status: Parent Educatior Other: _______  
4. Gender Female Male

   (You may circle more than one.) Hispanic Native American Other __________________

6. How did you hear about the conference? (Circle all that apply.)
   Teacher School Counselor Parent Friend Newspaper Ad Newspaper Article Classroom Visitor 
   Other _______

Circle a response that best reflects how you feel about each statement below.

7. I would recommend EYH to my friends. Absolutely Probably Probably Not Absolutely Not

8. I was interested in math and/or science before coming to EYH. Strongly Agree Agree Disagree Strongly Disagree

9. I am more interested in math and/or science because of EYH. Strongly Agree Agree Disagree Strongly Disagree

Circle a rating for each topic listed below and write additional comments in the space provided.

<table>
<thead>
<tr>
<th>10. Program Packets &amp; Workshop Materials</th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Comments:

| 11. Special Guest Speaker: Dr. Sandra Magnus, NASA Astronaut | 4 | 3 | 2 | 1 |

Comments:

| 12. Workshop I Number | Title | 4 | 3 | 2 | 1 |

Comments:

| 13. Workshop II Number | Title | 4 | 3 | 2 | 1 |

Comments:

| 14. Science Mall | 4 | 3 | 2 | 1 |

Comments:

| 15. Closing Activity: What’s My Line? | 4 | 3 | 2 | 1 |

Comments:

16. Why did you decide to come to EYH?
17. What did you like least about the conference?
18. If you were telling a friend about something memorable or fun that happened to you at the conference, what would it be? (Use the back of this form to tell us your story).
2001 EXPANDING YOUR HORIZONS CONFERENCE EVALUATION
WORKSHOP PRESENTERS & SCIENCE MALL EXHIBITORS

Tell us how to make EYH 2005 better! Just complete this form and bring it to the West Gym at the end of the day. To protect your anonymity, please do not write your name anywhere on this form.

1. Your status (circle all that apply) Student Educator Professional Other __________

2. Gender Female Male

3. I presented a (circle one) Workshop Science Mall Exhibit

4. Ethnic background: African-American Asian-American Euro-American/Caucasian (You may circle more than one.) Hispanic Native American Other ______________

5. Including this conference, how many times have you volunteered with an EYH conference? _____

6. Would you be willing to participate in a future conference? Yes No (If yes, please be sure to turn in a 2005 volunteer card.)

7. How would you classify your session/exhibit (math, botany, zoology, etc.) ______________

Circle a rating for each statement listed below and write additional comments in the space provided. “Session” = exhibit/workshop

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>My session was age-appropriate for the girls who attended.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The participants in my session seemed generally interested.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The room/space was properly equipped for my session.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EYH contacts kept me informed about the conference.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EYH contacts supported my session needs.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The volunteer dinner was helpful for conference preparation.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I enjoyed presenting/exhibiting for the EYH conference.</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. Why did you decide to volunteer with EYH?
16. What was least successful about your session?
17. If you were telling a friend about something memorable or fun that happened to you at the conference, what would it be? (Use the back of this form to tell us your story).
Appendix B:
Longitudinal Plan

Expanding Your Horizons: A Longitudinal Plan

Research Questions
Primary: How does attendance at EYH conferences affect girls’ math and science course choices in high school?
Secondary: How does race affect program effectiveness?

Stage 1: Fall 2004
Meet with High School Contacts: Arcata, Eureka, Hoopa to ask how data is organized and possible processes for extracting data in Fall 2005 (analysis of full population data)

Stage 2: Winter 2005
Preliminary focus group of three girls who attended EYH Conferences
- Solicit three girls to consult with research
- Pilot focus group- refine focus group guide

Stage 3: Spring 2005
Conduct focus groups.

<table>
<thead>
<tr>
<th>EYH Attendees</th>
<th>EYH Non-Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 groups of white girls</td>
<td>2 groups of white girls</td>
</tr>
<tr>
<td>2 groups of Native American girls</td>
<td>2 groups of Native American girls</td>
</tr>
<tr>
<td>2 groups of Latina girls</td>
<td></td>
</tr>
</tbody>
</table>

Use Focus group responses as an aid in refining the questionnaires

Stage 4: Fall 2005
- Database Extraction (data obtained from partnering schools)
- Surveys: Phone & Mail Administer Questionnaires
- Random Sample of 400 girls: (200 participants; 200 non-participants); Oversample on 2001 participants (will have had more class decision opportunities); Oversample on Native American and Hispanic girls).
Stage 5: Winter/Spring 2006
Data Analysis
Write Report
Report Findings
Present Findings at Conferences

Project Website: http://www.humboldt.edu/~soc/eyh.htm
Appendix C:
IRB/Human Subjects Proposal

Humboldt State University
Committee For The Protection Of Human Subjects In Research
P.I.: Dr. Mary Virnoche, Department of Sociology

1. Purpose and Background
This 2-year project will determine the efficacy of the AAUW Humboldt Branch supported
Expanding Your Horizon (EYH) conference held biennially at Humboldt State University in
Northern California. The purpose of the conference is to encourage girls to take more math
and science in high school by exposing girls to engaging hands on activities and role models
in the areas of science, technology, engineering and mathematics. This conference has been
held for over 20 years, yet no study has been completed to determine the impact on girls’
decisions to take math and science in high school. This project will impact girls in a rural,
economically disadvantaged areas with a high Native American population. The outcomes
of the project will be used for the local branch to determine how to best use its resources to
support the encouragement of these girls to pursue careers in the math and science areas as
well as disseminate the findings for other national EYH sites to use.

2. Methods Section
Girls will be sent letters soliciting their participation in the study. To participate, girls will
need to return a letter signed by a parent or guardian providing consent. To entice
involvement, we will enter participants in a raffle for a series of prizes such as books, gift
certificates, science kits, t-shirts and a computer. Research for this project will include focus
groups and questionnaires.

The focus groups will solicit, through open-ended questions, attitudinal information about
science and math coursework and careers as well as decision making processes regarding
science and math coursework and career plans. Focus groups will be tape-recorded and led by Faculty Project Directors assisted by graduate research assistants. Data provided by the girls through focus groups will also help shape questionnaire design. The questionnaires will be developed during the planning phase of the project. In addition to demographic information, these questionnaires will solicit the following information primarily through close-ended questions: 1) attitudinal information about science and math coursework and careers; 2) past and anticipated science/math course enrollment; 3) decision making processes regarding science and math coursework; and 4) future career plans. Graduate research assistants will administer questionnaires via the phone and mail.

Graduate research assistants working with high school counselors to extract needed information from existing school databases will compile the full-population database. All data will be compiled and analyzed using resources in the Sociology Data Analysis Lab. SPSS software will be used with quantitative (survey) data. NVivo software will be used with qualitative (focus group) data.

We will compare enrollment patterns and science/math decision-making processes between EYH past participants and a comparison group of girls who did not attend EYH. This type of design that compares EYH and non-EYH participants will allow us to make methodologically sound statements about outcomes regarding EYH impact.

3. Subjects
We have access to contact information for 650 girls who participated in EYH conferences during Spring 2001 and 2003. The girls who will be contacted will be in 8th-12th grade; however, most of the past participants from these conference years will be in high school, enabling us to collect follow-up data regarding their math and science course enrollments. We
will use three samples of girls for collecting data: 1) girls who attended EYH conferences in 2001 and 2003, 2) girls who have not attended EYH conferences, and 3) a sub sample of the girls who attended the conferences in 2001 and 2003 for focus group interviews. Working with school counselors, we will aggregate existing data on the science and math enrollment patterns of the full-population of EYH and non-EYH girls at the 3 partner high schools. We will also include a sub sample of approximately 80 girls in 12 focus groups of 6-8 girls each. There will be three types of focus groups based on race (Caucasian, Native American, and Latina) for both EYH and comparison populations. We will collect additional survey data from a stratified random sample of 300 EYH and comparison group girls. We will over sample on girls from Native American and other minority communities.

4. Potential Benefits

Our primary research concern is whether or not the local EYH conferences are affecting the choices of middle school girls to take math and science courses at the high school level. Research suggests that there is a need for intervention at the middle school level, which is the age group the local EYH conferences cater to. In addition to evaluating the local conference’s effectiveness in general, we will also direct our research towards looking for differences in the program’s effectiveness for the minority and Caucasian girls within the community.

Through this evaluation process the strengths and weaknesses of the EYH conferences will be recognized, which will allow for program changes to be made at the local as well as national level.

5. Potential Risks

I foresee no potential risks for the interview respondents, because the questions will only involve information regarding their choices in participating in math/sciences courses and future
career goals. No personal information will be asked of the respondents, they will be told that they do not have to answer any questions that they do not feel comfortable with.

6. Management of Risks
Girls will be sent letters soliciting their participation in the study. To participate, girls will need to return a letter signed by a parent or guardian providing consent. Further, the respondents will be told that they can stop the interview at any point, and prior to the interview they will be told that they do not have to answer any questions that they do not feel comfortable with.
Appendix D:
Longitudinal Project Sampling

Total Number of mailings: 544 Total EYH: 101 Total Non-EYH: 443

Eureka High Sampling: Total Sample of 246 Girls

**EYH Girls**
2001: 14 girls
2003: 13 girls

*Total EYH Girls at Eureka High: 27*

**NON-EYH Girls**

9th Grade: 15 White
10 African American
18 Latina
17 Asian
22 Native American
1 Pacific Islander

*Total Freshman: 68*

10th Grade: 15 White
6 African American
20 Latina
13 Asian
33 Native American
1 Pacific Islander

*Total Sophomore: 88*

11th Grade: 15 White
2 African American
9 Latina
15 Asian
20 Native American
1 Pacific Islander
1 Filipino

*Total Junior: 63*

*Total Non-EYH Girls at Eureka High: 219*
Hoopa High: Total Sample of 117 Girls

EYH Girls

2001: 9 girls
2003: 15 girls

Total EYH Girls at Eureka High: 24

NON-EYH Girls

9th Grade: 13 Native American
   6 White
   1 Latina
   1 Filipino
Total Freshman: 21

10th Grade: 22 Native American
   5 White
   2 Latina
Total Sophomore: 29

11th Grade: 29 Native American
   5 White
   9 Latina
Total Junior: 43

Total Non-EYH Girls at Eureka High: 93

Mckinleyville High: Total Sample of 181 Girls

EYH Girls

2001: ? girls
2003: ? girls

Total EYH Girls at Eureka High: 50
NON-EYH Girls

9th Grade: 30 White
8 Native American
7 Latina
1 African American

Total Freshman: 46

10th Grade: 30 White
10 Native American
5 Latina
2 Asian

Total Sophomore: 47

11th Grade: 30 White
5 Latina
3 Native American

Total Junior: 38

Total Non-EYH Girls at Eureka High: 131
Appendix E:
General Letter to Parents

Department of Sociology
February 22, 2005

Dear Parent or Guardian:

Your daughter is invited to participate in a study looking at how girls at Arcata, Eureka and Hoopa High Schools are making decisions about the math and science course enrollment and career interests. If you give permission for your daughter to participate, she will be asked to participate in a phone survey and may also be invited to participate in a 1-2 hour small group discussion about course and career decision-making.

Participating girls and their parents or guardians will be invited to an ice cream party at Humboldt State University. The names of girls will also be entered into a raffle for a new computer, as well as books, gift certificates, science kits and more. Free bus transportation between Hoopa and Arcata will be provided. In addition to the fun around the ice cream party, your daughter may find it interesting to participate in a study that has national attention and provides the opportunity for her to reflect on her interests and actions around math and science.

Even though girls perform as well as boys in science and math, they lose interest in these areas beginning in middle school. Girls tend to take less math and science courses in High School making it more difficult and less likely that they pursue advanced science and math training and career paths. There have been national efforts to reverse this trend including Humboldt State University’s conference for middle school girls, Expanding Your Horizons (EYH), aimed at increasing High School math and science course enrollment. Some of the girls asked to participate in this study have attended past EYH conferences.

If you give permission for your daughter to participate, you also have the right to withdraw your consent at any time. Your daughter may discontinue participation at any time and she also has the right to refuse to answer any question. Your daughter’s privacy will be maintained in all published and written materials resulting from this study. Her real name will not be used in any written materials generated from discussion group audio recordings and surveys. Audio recordings will be destroyed at the close of the project. Any records that could link your daughter’s identity with the information she provides for the study will be kept in a secure location.

This project is partially funded by a National Community Action Grant from the American Association of University Women (AAUW). The study is directed by Dr. Mary Virnoche and Dr. Beth Eschenbach at Humboldt State University. If you have any questions or concerns, please contact Mary at by phone at (707) 826-4569 or by email at Mary.Virnoche@humboldt.edu. You may also contact confidentially Dr. Donna Schafer, Dean of Research and Graduate Studies at (707) 826-3949 schafer@humboldt.edu. You will find more information about this study on the Internet: http://www.humboldt.edu/~soc/eyh.htm
Sincerely,

Mary E. Virnoche    Beth Eschenbach
Assistant Professor    Professor and Chair
Coordinator of Practicing Sociology MA    Environmental Resource Engineering

Please keep one copy of this letter and return a signed copy in the envelope provided. Thank You.
I give permission for _______________________________ to participate in the study discussed above.

(Print Girl’s First and Last Name)
Ethnicity ____________________      Year in School___________________
Address_________________________                ___________________________________
City _________________________                Parent or Legal Guardian Name (Please Print)
Zip Code_______________________       _______________________________  ___________
Phone Number ________________             Parent or Legal Guardian Signature        Date
March 2, 2005

Dear Parent or Guardian:

Thank you for taking time to review the “Girls in Math and Science” study information included with my letter. I have been working with Professor Virnoche, a Sociologist at Humboldt State University, to better understand how local high school girls are making decisions about their math and science education and future careers.

Girls now take as many high school science classes as do boys (though fewer girls than boys take physics), and girls’ achievement levels are roughly the same as boys. Yet important disparities in aspirations and career paths remain. (American Association of University Women)

Your daughter was selected to participate in this study because she participated within the last five years in an Expanding Your Horizons Conference at Humboldt State University. These conferences are part of a national network to encourage girls to take more math and science in high school. Girls participating in the study will be asked to give phone interviews. Some will participate in group discussions about science and math course and career interests.

As indicated in the enclosed materials, your daughter’s privacy will be protected: her name will not be included in any reports produced by the project.

We want to make sure our girls are prepared to go on in any field that they choose. Please help us understand the issues better and return the materials provided.

Sincerely,
Appendix G:
Flyers Mailed to Girls

Can Girls Do Math and Science?
Do They Want to?
How come?

We want to hear what 300 girls from Arcata, Eureka and Hoopa High Schools have to say about these and other related questions. Be one of those girls!!

What Do I Have to Do?
A short phone interview
Maybe a small group discussion with other girls

What Do I Get?
• A free lunch or dinner (for those participating in group discussions)
• A chance to win a computer, books and other prizes
• An invitation to attend a party at HSU for girls participating in the study
• An opportunity to contribute to a study with national attention

How Can I Be Sure I am Included?
Have your parent or guardian complete the attached permission slip and return it to your school office.
Questions: Contact Mary.Virnoche@humboldt.edu 826-4569
Appendix H:
Longitudinal Project Focus Group Guide

Focus Group Guide

Group Identifying: Big Bear#   Oceanview #   Bayview #
Number of Participants:
Grade(s) in School:
Ethnicity:
EYH or Non-EYH:

School Culture – First – I would like to know a little bit about your school.
What are some of the best things about your high school?  (activities, other students, teachers, sports or?)
What are some of the worst things about your high school?  (activities, other students, teachers, sports or?)
Can you tell us a little about your high school teachers?  (Favorites and least favorites… why?)
What about other students?  (Cliques organization, How does that play out in the classroom?  How does that affect what you do outside the classroom).

Classes Taken
What about some of your favorite classes?
(Follow up: What about them made them so great? projects, teachers, other students?)
What about some of your worst classes?  (Follow up: What about them made them so bad?)

If math not mentioned
Let’s talk about your math classes.
What taken, Enjoyment, Challenge, Help Provided, Role Models

If science not mentioned
Let’s talk about your science classes.
What taken, Enjoyment, Challenge, Help Provided, Role Models
Class Selection

How have you gone about figuring out what classes you will take?
(Follow Up: Process, Significant People in the process)

Anything different regarding math and science?
(Follow Up: Do you think you’ll take math and science electives? How come?)

Future and Career

What are you thinking you will do after high school?
• Follow up: College for what? job?
• What do you think brought you to thinking about that idea(s)?
• What about that career/job is interesting and important to you?

Future and Math/Science
What do you think of when someone talks about a career in math? (Probe: images, what those people are like, ??)
What do you think of when someone talks about a career in science? (Probe: images, what those people are like, ??)

EYH

What do you remember about the EYH conference(s) that you attended?

How did you end up going to that conference? (people, interests?)

Looking back – do you think the conference changed your interests in math and/or science? (How so?)

Do you think that attending EYH influenced any of your decisions about classes or your current career interests? If yes, how did it influence you?
Appendix I:
Longitudinal Project Web Page

Project Website: http://www.humboldt.edu/~soc/eyh.htm

Expanding Your Horizons

Expanding Your Horizons in Science and Mathematics (EYH) are conferences created to promote and foster interest for girls in the areas of science and math. The conferences are held with hopes that girls who attend will be encouraged to consider careers in these disciplines. In 1976 the Math/Science Network formed the first EYH conference held at Mills College in Oakland California. The Math/Science Network was originally created in 1974 by a group of female math and science educators in San Francisco. The founders of the Math/Science Network were concerned with the low participation rates of females in math and science courses. It was this initial concern that spawned what is now known as a nationally recognized effort.

Since the first EYH event more than 575,000 6th-12th grade girls and approximately 59,000 parents and educators have attended EYH conferences. In the 2000-2001 school year, there were 100 individual conferences held in 29 states, reaching 28,000 students. Humboldt State University is one of the host sites for EYH. The goals of the conference are:

- To provide young women with opportunities to meet and interact with positive women role models who are active in math and science related careers;
- To involve young women with limited opportunities for success in positive experiences in mathematics and science;
- To increase the interest of young women in math and science by providing exciting and fun hands-on learning experiences;
- To encourage young women to study as much math and science as possible by showing them the benefits of education and its relevance to their lives;
- To foster awareness of career opportunities in science and math related careers.

Grant Awarded For Longitudinal Study

Mary Virnoche, Sociology, and Beth Eschenbach, Environmental Resource Engineering, were awarded an AAUW Community Action Grant of $7500 to evaluate the efficacy of the EYH Conference. Practicing Sociology MA student Leah Thompson will continue her work on the project.