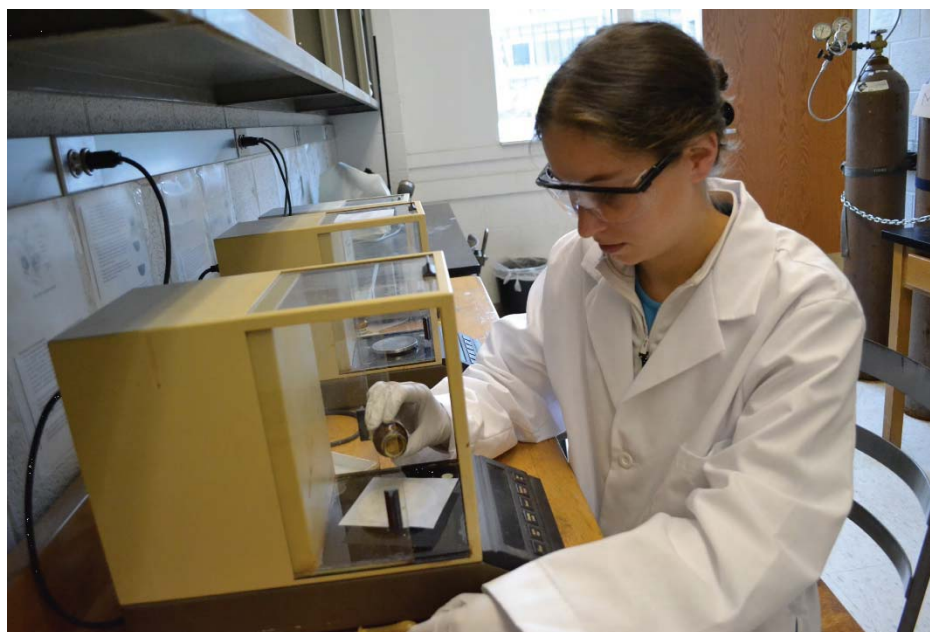




Women in Science and Engineering Roundtable (WISER) Evaluation Study Report

April 2016



PURPOSE OF STUDY

An evaluation study of the Women in Science and Engineering Roundtable (WISER) program was initiated in August 2015 by the Flora Stone Mather Center for Women with support from Dr. Susan Klarreich. The study was conducted by Chantal van Esch, PhD candidate in Organizational Behavior under the supervision of Diana Bilimoria, PhD, Professor and Chair of the Department of Organizational Behavior.

The purpose of the study was to evaluate the impact of the WISER program on participating students and recent alumnae of Case Western Reserve University. Analyses included both interview and archival data. Findings from 10 in-depth interviews of WISER students and alumnae are presented below. Next, the results of statistical analyses of students' archival data are reported. Data for the archival analyses were obtained through CWRU's Office of Institutional Research.

QUALITATIVE STUDY: INTERVIEWS WITH WISER PARTICIPANTS

In the first part of the evaluation study, in-depth interviews were undertaken with 1 WISER advanced student and 9 recent alumnae. The sample represents a 56% response rate of the 18 alumnae and students, all women, who were identified by the Associate Director of Women in Science & Engineering, Heather Clayton Terry. All the women were contacted via email and received an initial invitation to participate and at least one follow up email. Interviews were conducted in person when possible (40%) or via phone (50%) or skype (10%) when this was not possible. Interviews centered on why the participant joined WISER, what activities they were involved with in WISER, and how WISER had helped them. Content analysis was conducted to illuminate the findings. The main themes which emerged from the data are presented next.

Theme 1: WISER Activities and Participation

Interviewees mentioned participating in a wide array of WISER activities and programs. Most students found out about WISER before the start of school via mailings (2) or at the first year student activities fair (4), although a number of these students did not participate (at all or actively) until later in their programs of study. Other students individually sought out particular opportunities (like volunteering and mentoring) or were invited to join ongoing WISER activities by a friend. One interviewee's thought that "the variety of activities helped to make WISER accessible," was supported by all other interviewees' experiences. Usually interviewees participated in one activity for a while before fully immersing in WISER and branching out to other available activities.

Overall, interviewees had very positive experiences with the activities and programs offered by WISER. They mentioned appreciating making connections and learning to network at social events as well as learning from professionals in talks and through professional mentoring. They also learned from other students as well as professors in general body meetings and OChem office hours. They found chances to give and receive support on the WISER executive board and through peer mentoring. Finally, they appreciated having the opportunity to give back via the volunteer opportunities. The one activity that had some mixed feedback was the peer mentoring program. The peer mentor/mentee matches seem to be hit or miss, with some students describing their experience as "fantastic" while others found them "not too helpful" indicating a lack of connection with their peer mentor or mentee.

Theme 2: Accomplishment of WISER Learning Goals

The interviews specifically sought responses about interviewees' development on WISER's five learning goals (confidence and self-efficacy, teamwork, responsibility and accountability, leadership, and mentoring and service) which had been indicated by the Associate Director of Women in Science & Engineering. Interviewees specified that they had enhanced their confidence and self-efficacy, teamwork, responsibility and accountability, leadership, and mentoring and service through participation in WISER activities in the following ways.

CONFIDENCE AND SELF-EFFICACY: Four of the respondents indicated that WISER had improved their confidence. These alumnae particularly talked about confidence in

classes and being able to “talk to professors.” One mentioned confidence in the leadership skills she developed through WISER.

TEAMWORK: No interviewee specifically mentioned teamwork, however three interviewees talked about skill development which would help in working with others. Specifically, these interviewees talked about learning how to work with people “at all levels” (including students and administrators), finding “common ground” with others, and developing interpersonal and communication skills.

RESPONSIBILITY AND ACCOUNTABILITY: Two interviewees mentioned how WISER improved their responsibility and accountability. Specifically, one alumna talked about how being a part of the executive board made her be “more accountable” to other WISER functions. The other talked about how WISER helped her with “learning how to plan,” which helped in managing her classes.

LEADERSHIP: Almost all interviewees described leadership experiences which they had as a part of WISER. Most (8) of the interviewees served on the WISER executive board at some point in time. Two participants specifically mentioned “expanding” and “building” leadership skills when asked how WISER had helped them.

MENTORING AND SERVICE: Most interviewees (5) mentioned the importance of “giving back,” helping “underserved populations,” and “loving outreach.” Additionally, seven interviewees mentioned developing skills in mentoring and two mentioned how WISER helped them to develop skills as volunteer coordinators. Most individuals (9) served as a peer mentor, and generally they had been a mentee first (7).

The numbers presented in this section may underestimate the number of interviewees who actually developed these skills as students often may not see their own progression. However, interviewees did mention a number of other benefits that they received from WISER participation, as explained next.

Theme 3: Other Benefits

Interviewees mentioned a number of other benefits they received from WISER, some of which loosely tie into the WISER learning goals mentioned above while others are distinct.

Almost all interviewees indicated that **SOCIAL SUPPORT** was not only one of the



reasons that they joined WISER (7; including looking for “social support,” “friends,” and “peer mentors”) but also that social support was one of the ways in which WISER had helped them (8). This provided students not only with “friends” but also with “objective feedback,” a “sounding board”, stress management, and their “only chance to see other women.”

Another common benefit was **PROFESSIONAL DEVELOPMENT** support.

Interviewees received professional development support from other students (7), the Associate Director of Women in Science & Engineering (5), and from professional mentors (7). They received advice, but also tangible benefits such as network connections, recommendations for jobs, and insight on job postings in their field. These same sources also helped interviewees to develop skills around “seeing the bigger picture” and expanding career options, professional communication skills such as presenting, interviewing, and writing emails, resumes and cover letters, networking and “etiquette,” and general understanding of their field and career options. Three interviewees also mentioned receiving much-needed financial aid from WISER.

Finally, all interviewees indicated that being a part of WISER was a positive experience, one indicating WISER made her “happier” and another claiming it made her “more positive towards the university.”

Theme 4: Retention in Science, Technology, Engineering, Mathematics and Medicine (STEMM)

Most interviewees believed that their major and career choice would have been the same with or without WISER. However, one interviewee indicated that she did not think she would have remained in STEMM without WISER while another indicated that WISER was actually the reason that she left STEMM (specifically indicating that the support she got from WISER and having a sounding board allowed her to think through and make this decision). For the purposes of this study STEMM was conceptualized as Case Western Reserve's divisions of Engineering, Nursing, Sciences and Math and the Pre-Professional programs of Pre-Medical and Pre-Dental. At the time of the interviews, eight of the women were still in STEMM careers or majors, the other two had moved on to business and social science careers.



Theme 5: Cleveland, Ohio

Interviewees were also asked about why they chose to stay in or leave Cleveland. Of those asked (8; this question was suggested after the first two interviews), most interviewees made their decisions of location after graduation based on job and graduate school opportunities (3) or family (4). Some participants mentioned the need to explore (3) and therefore leave Ohio temporarily, and one participant mentioned needing to “be closer to the beach”. These three interviewees who needed to explore indicated that they would move back to Cleveland if the right opportunity came up and one of them was actively looking for such an opportunity.

Theme 6: Overall Experience of WISER

Overall, all interviewees reported a positive experience with WISER and general support for all events. Specifically, WISER was referred to as “the highlight of undergrad” and one student mentioned that she “couldn’t imagine how [her] college career would have gone without WISER.”

The two areas that were indicated as having room for improvement were the peer mentoring component and contact with alumni after graduation (specifically desiring to be more involved and to receive more alumni based communication).

IMPACT STUDY: CLASS OF 2011

Case Western Reserve University’s Office of Institutional Research provided data for the 905 students (including 79 WISER program participants) who came in as the Class of 2011. The data included responses to the National Survey of Student Engagement (NSSE) for those students who completed it, information on graduation, degree, credit hours, and GPA for all students, as well as who had participated in WISER as indicated by the Associate Director of Women in Science & Engineering.

There were five students with triple majors and 111 students with double majors. These students had to be filed under one major; in instances where they had a STEMM related major this was the one chosen to represent their degree. Often the degree not included for double or triple majors was an arts, music, or language degree or in some cases a second science or engineering degree (for example, Mechanical Engineering and Aeronautic Engineering degrees were often obtained together).

When possible, analyses were conducted to compare WISER students with (1) all other students, (2) male students, and (3) female students not in WISER. Additionally, analyses were conducted on (1) the entire student population, (2) only those students who indicated interest in a STEMM degree when they applied to CWRU (here we included students who indicated interest in the divisions of Engineering, Nursing, Science and Math

and those who were Pre-Professional in the Medical or Dental area), and finally (3) those that graduated with STEMM degrees. Tests of significant differences were assessed using t-tests and chi-squared analysis. Figures report the differences in means or percentage, with significant differences from WISER students indicated with an asterisks, and number of respondents in each category listed.

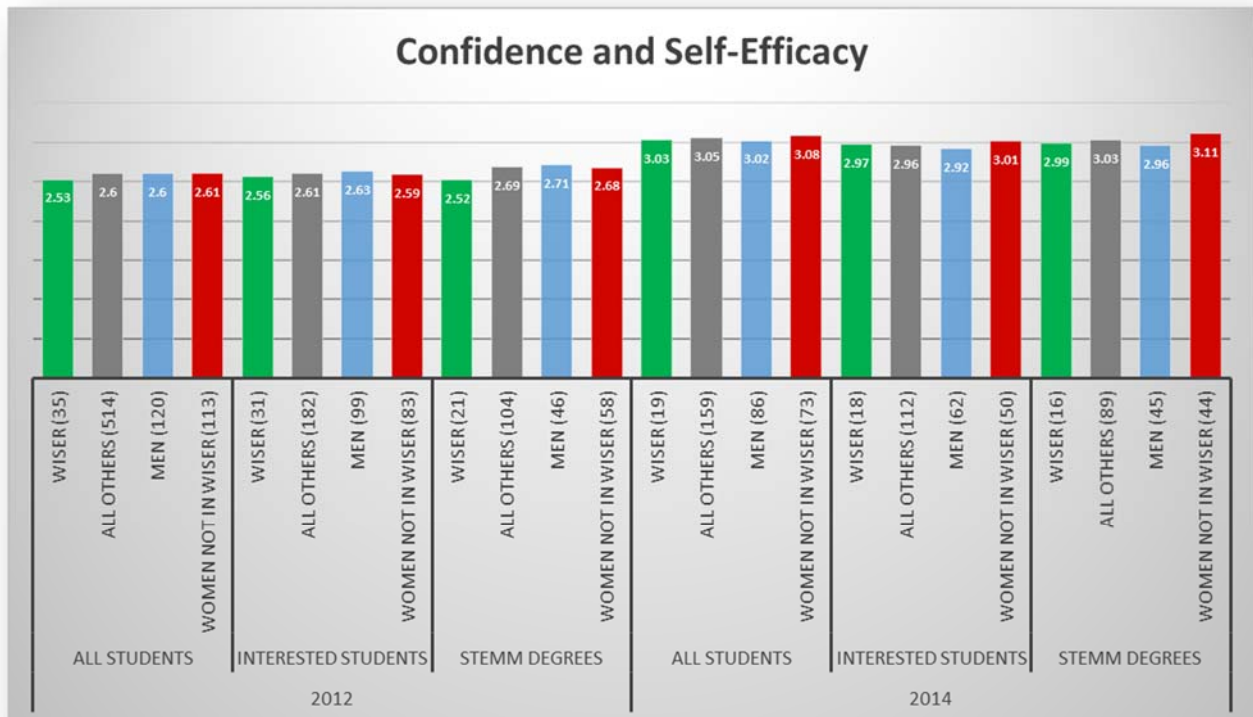
WISER Learning Goals

From the NSSE responses we were able to create scales to test four of the five learning goals indicated by WISER. Specifically, the NSSE had items around confidence, teamwork, responsibility, and mentoring; unfortunately no leadership type questions were asked. All scales present scores out of four. Since NSSE data were collected at two time points (Spring 2012 and Spring 2014 – when students were 2nd semester first years and juniors respectively), data will be presented for each time point. Some questions changed slightly in their wording between the two time points; for consistency and clarity the wording of the 2012 survey is used in this report. Overall, we see a trend which indicates that CWRU students improved on these skills between the two time points.

CONFIDENCE AND SELF-EFFICACY: The NSSE included the following questions which indicated a student’s confidence and self-efficacy: “Asked questions in class or contributed to class discussions,” “Made a class presentation,” and “Acquiring job or work-related knowledge and skills.” Each of these questions were measured on a four point scale so the mean of student’s answers to these questions were used. All scores are presented in the Confidence and Self-Efficacy Figure below.

In 2012, WISER students averaged a 2.53 confidence score and did not significantly differ from any of the other groups. WISER students who had indicated interest in STEMM when starting at Case Western Reserve University averaged a 2.56 confidence score and WISER students who graduated with STEMM degrees averaged a 2.52 confidence score. None of these scores were significantly different than any other groups.

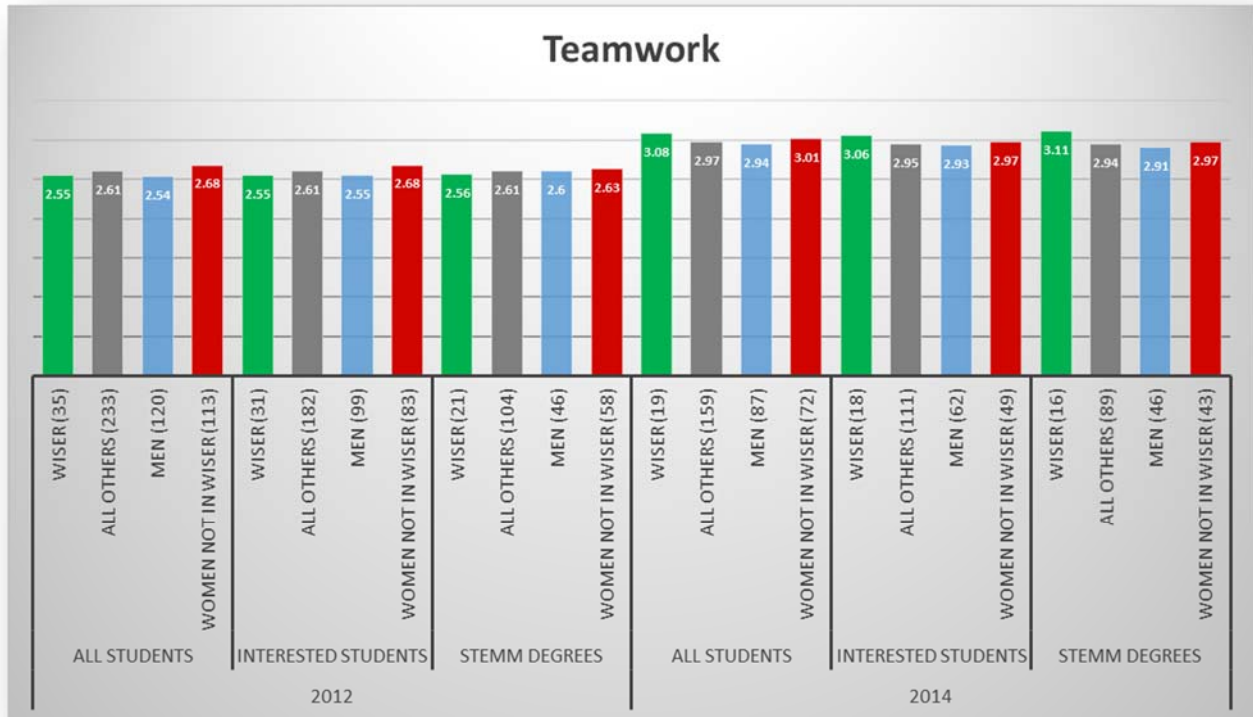
In 2014, WISER students averaged a 3.03 confidence score but again did not significantly differ from any of the other groups as all groups scores increased. WISER students who indicated interest in STEMM had an average confidence score of 2.97 and those that graduated with STEMM degrees had an average score of 2.99. Again, none of these scores were significantly different from any of the other groups.



TEAMWORK: The following questions were taken from the NSSE to indicate a student's use of teamwork skills; "Included diverse perspectives (different races, religions, genders, political beliefs, etc.) in class discussions or writing assignments," "Worked with other students on projects during class," "Worked with faculty members on activities other than coursework (committees, orientation, student life activities, etc.)," "Had serious conversations with students of a different race or ethnicity than your own," "Had serious conversations with students who are very different from you in terms of their religious beliefs, political opinions, or personal values," "Tried to better understand someone else's views by imagining how an issue looks from his or her perspective," "Work on a research project with a faculty member outside of course or program requirements," and "Working effectively with others." Like the confidence scale, each of these questions were measured on a four point scale so the mean of students' answers to these questions was used. All Teamwork scores are presented in the Figure below.

In 2012, WISER students had a mean teamwork score of 2.55, those who came in with an interest in STEMM had an average score of 2.55, and those that graduated with a STEMM degree had a teamwork score of 2.56. These scores did not differ significantly from any of the other groups.

In 2014, WISER students' teamwork score increased to 3.08, those that had indicated an interest in STEMM fields had increased to 3.06, and those who graduated with a STEMM degree averaged 3.11. These scores were not significantly different from any of the other groups.

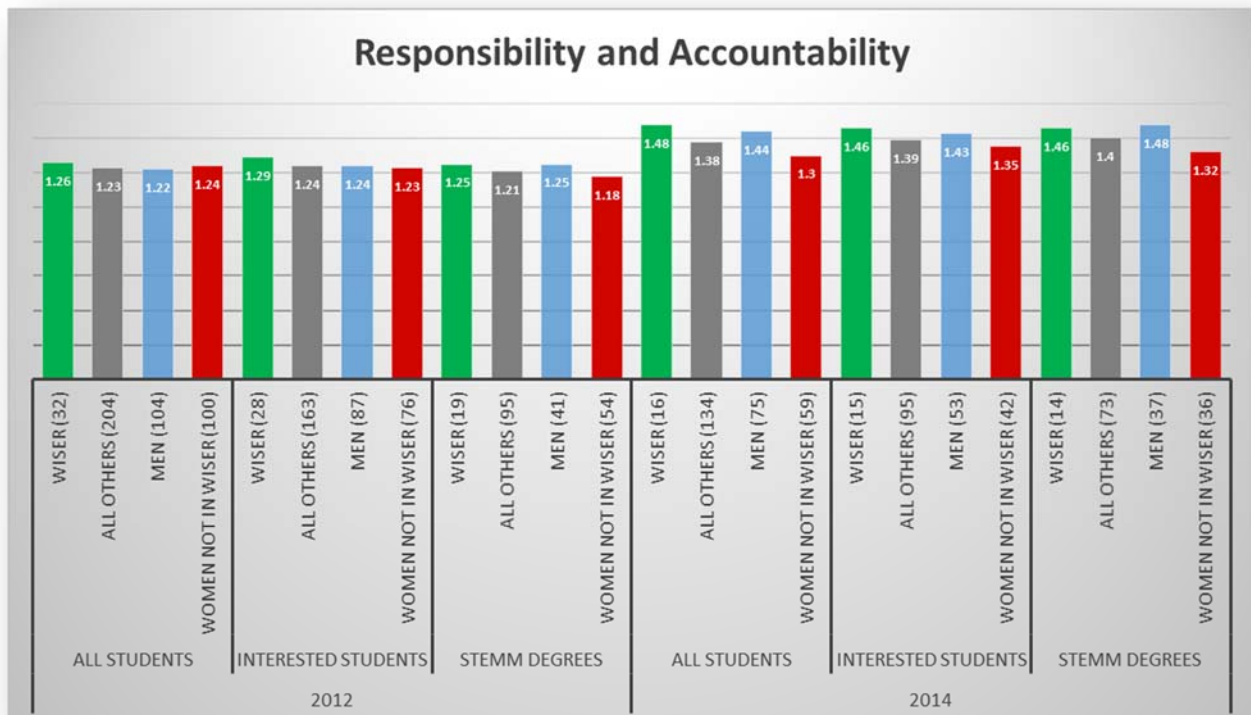


RESPONSIBILITY AND ACCOUNTABILITY: The NSSE also measured the amount of time students spent in particular activities. To measure responsibility and accountability we included responses to the following questions; “Preparing for class (studying, reading, writing, doing homework or lab work, analyzing data, rehearsing, and other academic activities),” “Working for pay on campus,” “Working for pay off campus,” “Participating in co-curricular activities (organizations, campus publications, student government, fraternity or sorority, intercollegiate or intramural sports, etc.),” and “Providing care for dependents living with you (parents, children, spouse, etc.)” Since each of these questions were measured on an 8 point scale, the averages were divided in half to maintain consistency across learning outcomes and are out of a total of 4 points. The scores are reported in the Responsibility and Accountability Figure below.

In 2012, WISER students averaged a 1.26 responsibility score and did not significantly differ from any of the other groups. WISER students who had indicated interest in STEMM

when starting undergrad averaged a 1.29 responsibility score and the WISER students who graduated with STEMM degrees averaged a 1.25 responsibility score. None of these scores were significantly different than any other groups.

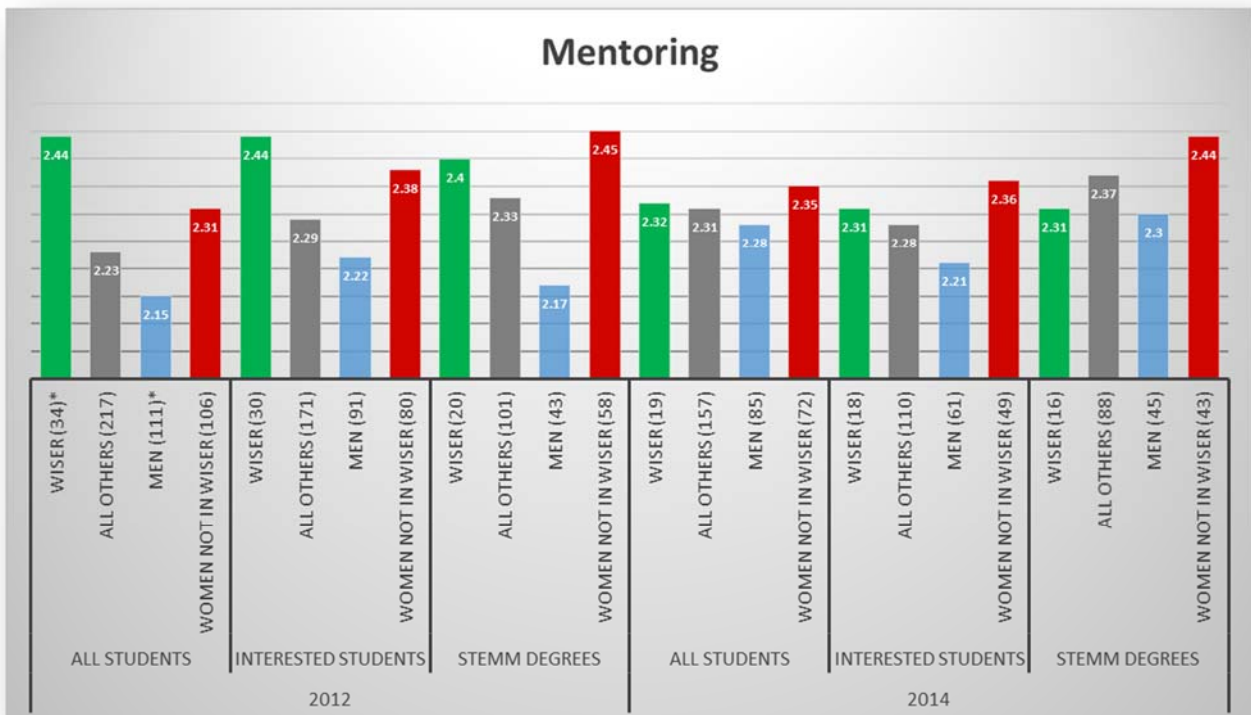
In 2014, WISER students averaged a 1.48 responsibility score but again did not significantly differ from any of the other groups as all groups scores increased. WISER students who indicated interest in STEMM had an average responsibility score of 1.46 and those that graduated with STEMM degrees had an average responsibility score of 1.46. None of these scores were significantly different from any of the other groups.



MENTORING: The final learning goal which the NSSE measured was mentoring. This scale included the following questions; “Tutored or taught other students (paid or voluntary),” “Participated in a community-based project (e.g., service learning) as part of a regular course,” “Community service or volunteer work,” and “Contributing to the welfare of your community.” These questions were also measured on a four point scale, so the average of the student’s responses was used. All scores are reported in the Mentoring Figure below.

In 2012, the mentoring scores of WISER students averaged 2.44 (also 2.44 for those interested in STEMM and 2.40 for those who graduated with a STEMM degree) and although they were higher than almost all other groups (except for women not in WISER who received STEMM degrees) this difference was only significant in the all student group when compared to men (who averaged 2.15; $t(143)=2.48$, $p=.04$; the two groups are signaled in the Mentoring Figure by an asterisk).

In 2014, the mentoring scores of WISER students averaged 2.32, with 2.31 for those students who had originally indicated an interest in STEMM, and 2.31 for those who graduated with a STEMM degree. None of these scores were significantly different from any of the other groups.

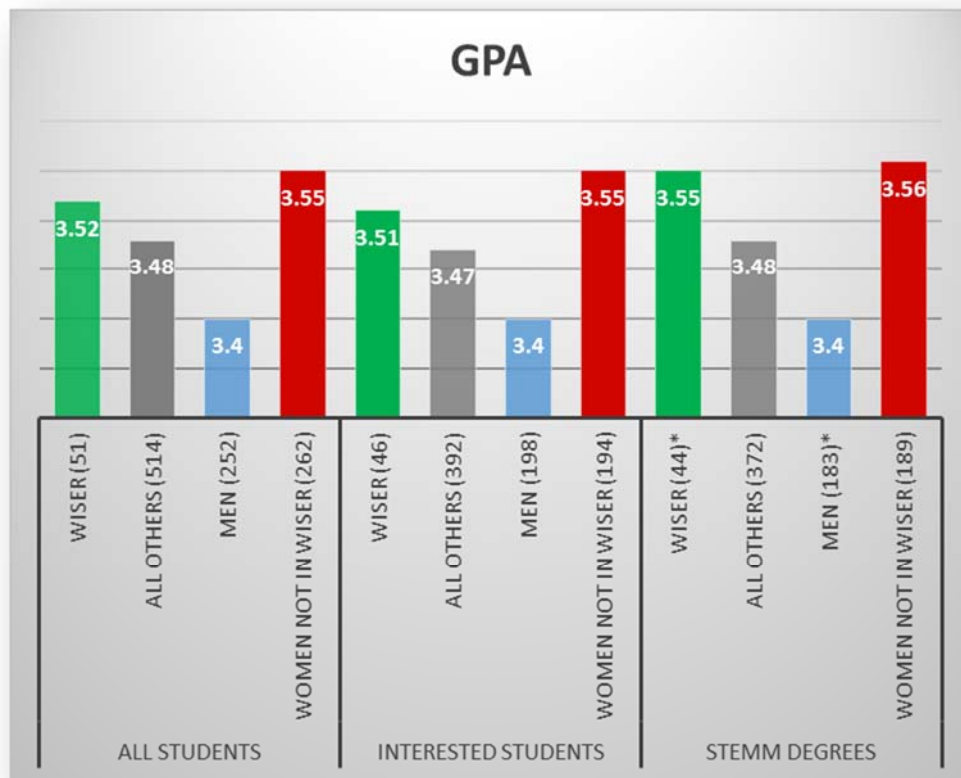


Objective Outcomes

The data of the Class of 2011 also allowed us to test differences in objective outcomes between WISER students and other Case Western Reserve University students. Specifically we looked at the differences in GPA, number of credit hours, 4 year graduation rates, and percentage of students receiving science degrees.

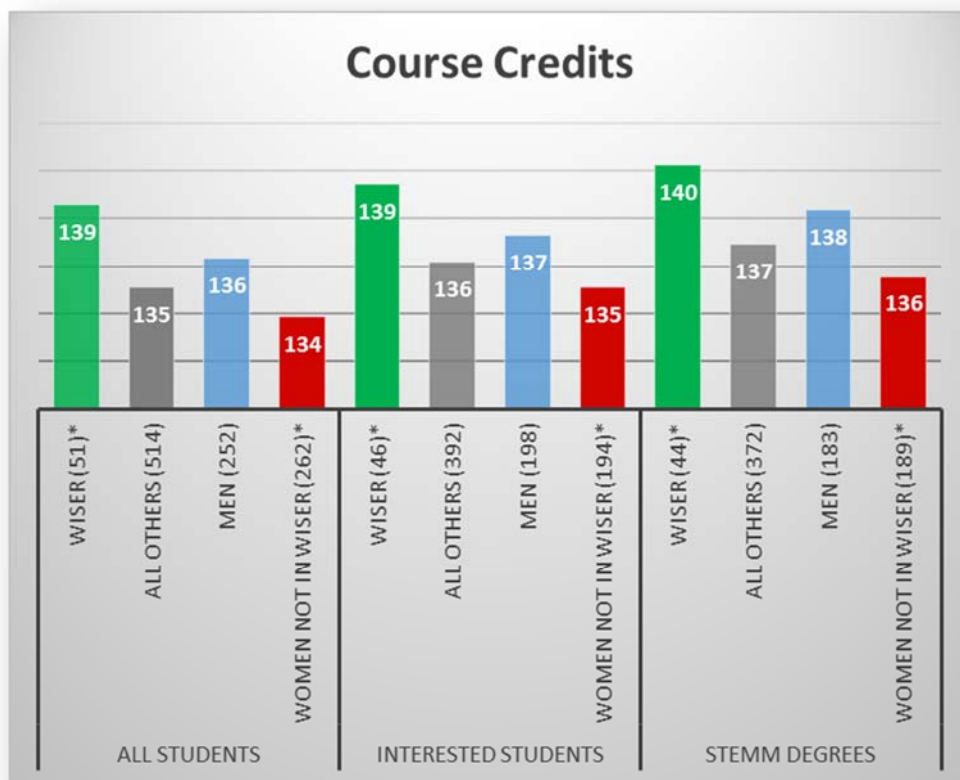
As with the learning goals outcomes, analyses were conducted to compare WISER students with (1) all other students, (2) male students, and (3) female students not in WISER. When possible, analyses were conducted on (1) the entire student population, (2) only those students who indicated interest in a STEMM degree when they applied to CWRU (here we included students who indicated interest in the divisions of Engineering, Nursing, Science and Math and those who were Pre-Professional in the Medical or Dental area), and finally (3) those that graduated with STEMM degrees.

GPA: Student GPAs were compared to understand the differences in WISER student GPAs and other students GPAs. WISER students had an average GPA of 2.44. The only significant difference between WISER student GPAs was with men who got degrees in STEMM fields (3.55 compared to 3.40; $t(235)=2.24, p=.03$). The GPA Figure below shows average GPAs for all groups (the groups that are significantly different at the alpha = .05 level are again marked with an asterisk).



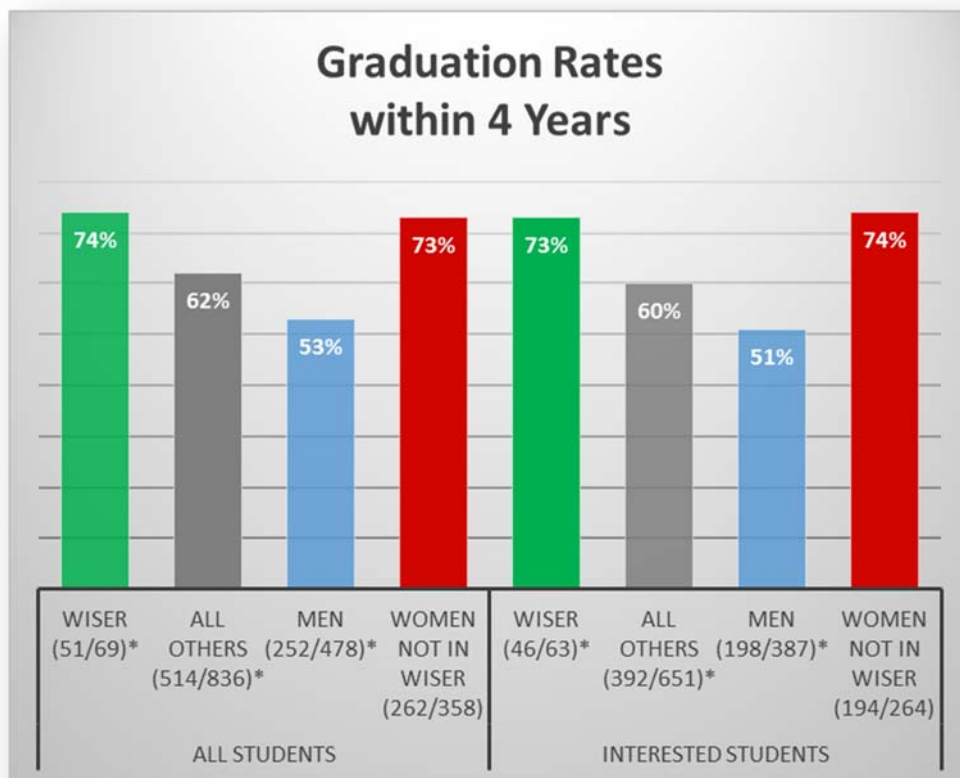
TOTAL COURSE CREDITS: The total number of course credits which students completed was also looked at as an objective outcome. Results indicated that WISER students averaged a total of 139 course credits, this did not differ significantly from the all

other student group nor the men's group. There was a significant difference in number of course credits taken by WISER women and nonWISER women across all three categories though; when looking at all students WISER women completed 139 credits on average compared to 134 by women not in WISER ($t(311)=2.41, p=.02$), of those students who indicated interest in STEMM degrees WISER women averaged 4 more credits than nonWISER women (139 compared to 135, $t(238)=2.13, p=.03$), and when looking at women who graduated with a degree in STEMM those who were in WISER averaged 140 credits compared to 136 credits of those who were not in WISER ($t(231)=2.28, p=.02$). All information on number of course credits completed can be found in the Course Credit Hours Figure below, groups with significant differences (at the $\alpha = .05$ level) are marked with an asterisk.



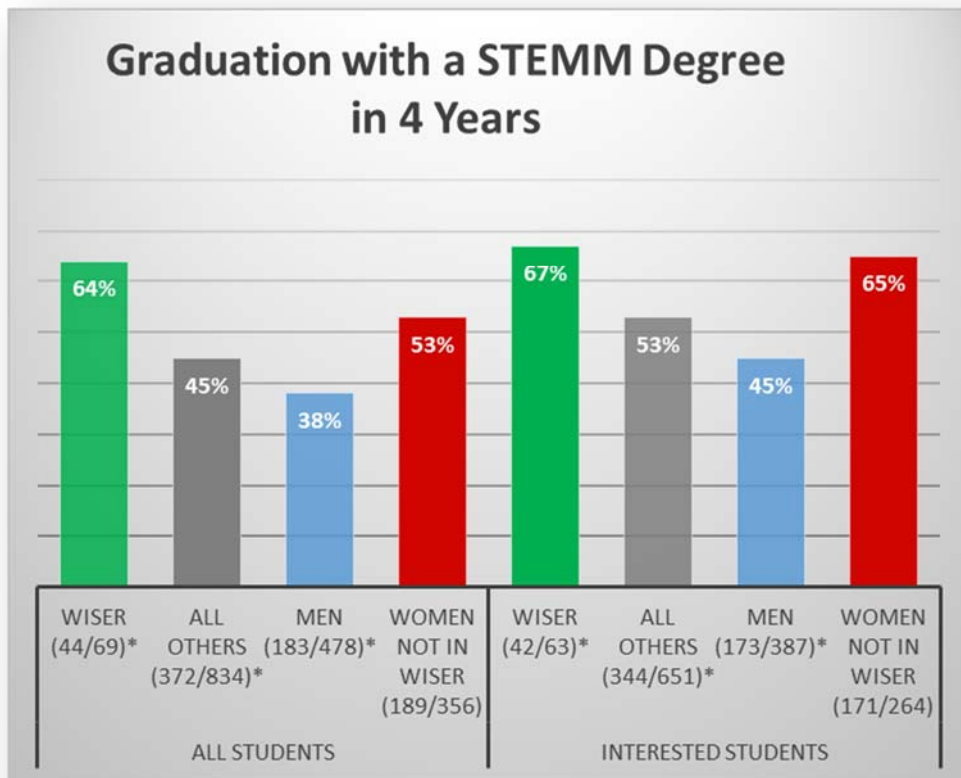
GRADUATION RATES: Graduation rates were compared for all students as well as those who originally indicated interest in STEMM degrees when joining Case Western Reserve University. As all students with a STEMM degree inherently graduated, the following analysis only looks at the first two samples. The graduation rate for all students in WISER (74%) was higher than all other groups, significantly higher compared to other

students overall ($\chi^2=4.20$, $df=1$, $p=.04$) and compared to all male students ($\chi^2=10.96$, $df=1$, $p<.01$), however they were not significantly different from women not in WISER. When looking at students who indicated interest in STEMM degrees, WISER student's graduation rate (73%) was significantly higher than other students ($\chi^2=4.42$, $df=1$, $p=.04$) and men's ($\chi^2=10.42$, $df=1$, $p<.01$) and slightly, but not significantly, lower than women not in WISER. Graduation rates, as a percent of those in the group who graduated within four years, can be found on the Graduation Rates Figure below, with groups that were significantly different marked with an asterisk.



GRADUATION WITH A STEMM DEGREE: Finally, we used the data provided to find the percentages of WISER students and others who graduated with a degree in a STEMM field. As mentioned earlier, if students graduated with multiple degrees they were included as having graduated with a STEMM degree as long as one of their degrees fell under the STEMM classification. Similar to the percentage of students who graduated in 4 years in general, women in WISER were significantly more likely (74% vs 45% and 38%) to have graduated with a degree in STEMM than students not in WISER and men respectively ($\chi^2=9.42$, $df=1$, $p<.01$ and $\chi^2=16.13$, $df=1$, $p<.01$) but not significantly more likely to graduate

with a degree in STEMM than women not in WISER (53%). Additionally, when looking solely at the students who indicated interest in STEMM when they started at Case Western Reserve University, we see a similar effect. Women who were in WISER were more likely to graduate with a degree in a STEMM field (67%) than other students who indicated interest (53%; $\chi^2=4.42$, $df=1$, $p=.04$) and men who indicated interest (45%; $\chi^2=10.48$, $df=1$, $p<.01$) but were not significantly more likely to graduate with a degree in STEMM than women who were not in WISER (65%). Please see the Graduation with a STEMM Degree Figure below for all percentages.



CONCLUSIONS

The results of the qualitative analyses indicated that participation in WISER has positive effects on students and alumnae, especially in the provision of **SOCIAL SUPPORT** and **PROFESSIONAL DEVELOPMENT**.



Interviewees carried positive affect towards WISER and the opportunities it provided them. They appreciated being in **LEADERSHIP** as well as **BONDING WITH OTHER WOMEN** who were in similar fields. Finally, WISER provided the **DEVELOPMENTAL SUPPORT** that allowed students to **FIND THEIR PLACE IN STEMM OR OUTSIDE OF IT**.

The results of the impact study using data from the NSSE surveys indicated that overall CWRU students improved greatly over the two survey time points. Additionally, we found that as far as the learning goals went, WISER students had **HIGHER MENTORING SCORES THAN ALL MEN IN 2012**.

There were more differences in objective outcomes. Of those who **GRADUATED WITH STEMM DEGREES**, WISER STUDENTS HAD HIGHER GPAS THAN MEN. Across all categories (all students, interested students, and STEMM degree students), **WOMEN IN WISER HAD HIGHER NUMBERS OF COURSE CREDITS THAN WOMEN NOT IN WISER**. Finally, the impact analysis showed that **WOMEN IN WISER HAD SIMILAR RATES OF GRADUATION IN 4 YEARS AS OTHER WOMEN, WELL ABOVE THE GRADUATION RATES OF ALL OTHERS AND MEN** in both categories (all students and students indicating interest in a STEMM degree when they applied to CWRU). **WISER WOMEN ALSO HAD SIMILAR RATES OF GRADUATING WITH A STEMM DEGREE IN 4 YEARS AS OTHER WOMEN, AND HIGHER RATES THAN ALL OTHERS AND MEN** in both categories (all students and students indicating interest in a STEMM degree when they applied to CWRU).

The main conclusions from this evaluation study is that WISER provides important benefits to many women students and constitutes an important element of their lives during their years at CWRU.