Girls in Engineering
2015 Annual Update
Executive summary

Objective

The Girls in Engineering Program (GiE) is an initiative delivered by The University of Western Australia (UWA) with support from Rio Tinto.

The GiE program aims to engage secondary school girls in the world of science and engineering and to inspire the girls to consider engineering as a career path.

Less than 12% of the engineering workforce is composed of women. This gender imbalance means the industry is significantly underutilising a key part of the workforce which is detrimental to economic productivity and growth.

Focus areas

The GiE program is focused primarily on providing outreach activities and resources to Years 7 – 10 with the aim of:

- Engaging the students through hands-on activities, during school visits, which showcase the opportunities a career in engineering can offer
- Providing the students and teachers the opportunity to participate in an on-campus GiE workshop
- Linking students with female industry engineers and university engineering students to provide mentorship
- Updating teachers and students on additional opportunities and events of interest

Program overview

Launched in 2014, the program was first established with five partner schools and a further six schools in 2015. To date, the program has engaged with over 1,480 students through a combination of in-school and on-campus interactions.

Key achievements:

- 1,146 students engaged in workshops
- 43 in-school workshops delivered
- 15 industry professional presentations
- 335 girls have participated in on-campus activities
- One school reported 500% increase in interest for maths related subjects
Engineering activities

The GiE program has successfully developed a suite of engineering based activities aimed at introducing basic engineering principles to high school students. These include six Biomimicry activities and four discipline-specific challenges within the Irrigo Mine Site Challenge; Mining, Civil, Electrical and Software engineering.

The activities have been delivered throughout the 2015 in-school visits with volunteer support from Rio Tinto and UWA engineering students. Details of these activities are listed in the table below.

Mentoring program

In 2015, 48 current UWA engineering students have been paired with industry mentors, in conjunction with the Faculty’s Women in Engineering strategy. Thirty-five of these mentors are female engineers currently in the workforce, and the remaining 13 are engineering mentors found through the University’s well-established Career Mentor Link.

The purpose of the mentoring program is to provide knowledge and guidance to current students, and support students in their journey from study through to employment.

<table>
<thead>
<tr>
<th>GiE Engineering Activity</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>What type of engineer could you be?</td>
<td>Students will see that their interests do align to certain types of engineering and that they could be an engineer.</td>
</tr>
<tr>
<td>Share, Share, Trade</td>
<td>Students will be interacting and learning about the different types of engineering. This activity will impart a lot of information in a fun way in a short amount of time.</td>
</tr>
<tr>
<td>Biomimicry – What inspired what?</td>
<td>Problem solving in groups, students think about how nature can inspire the development of different engineered products. Students will also learn about the different areas of engineering and the different types of things that engineers in these areas develop.</td>
</tr>
<tr>
<td>Biomimicry – Vegetable plant investigation</td>
<td>Students to work in groups and investigate why some vegetables are clean when grown in dirt while others are dirty. Students will observe that some plant leaves are water repellent and self-cleaning. Students will think about how this self-cleaning property can inspire engineered technology.</td>
</tr>
<tr>
<td>Biomimicry – Design challenge</td>
<td>Students think about how nature can inspire the development of different engineered products. Students will be problem solving in groups to come up with new/improved products that are inspired by nature.</td>
</tr>
<tr>
<td>How to solve a Rubik’s cube</td>
<td>By solving the Rubik’s cube, students will improve skills such as problem solving, spatial and critical thinking, memorisation, patience and persistence.</td>
</tr>
<tr>
<td>Irrigo Mine Site Challenge</td>
<td>Teaches students in a hands-on way about four different areas of engineering (Mining, Electrical, Civil and Software). In groups, students solve real-world problems by breaking the problem down into four smaller challenges and use skills from four areas of engineering to solve the challenges.</td>
</tr>
</tbody>
</table>

Future initiatives

GiE will continue to deliver value to the program’s 11 partner schools in 2016 by developing a schedule for in-school visits and delivering on-campus events throughout the year.

Future initiatives and events planned for 2016 include:

- Teachers from all 11 partner schools will be invited on-campus for a teacher reference group aimed at fostering collaboration, feedback and idea generation
- A career advice booklet profiling the careers of female Rio Tinto engineers will be developed and distributed to high schools
- A networking event will take place mid-year to identify current working challenges and develop solutions that STEM practitioners can implement
- A thank you event will be delivered at the end of each year to recognise volunteers and celebrate the achievements of the program
School visits

In 2015, the GiE program established partnerships with a further six schools, bringing the total number of program partner schools to 11. The program has engaged with 1,146 students from years 7-10 through its in-school activity delivery.

Activity Coordinators

33 UWA Engineering Students and 32 Industry Professionals have been recruited and trained to engage high school students during in-school visits.

Engaging students

A typical school visit begins with a presentation to introduce students to the basic concepts related to engineering.

This provides a brief overview of the different types of engineering available for students interested in studying engineering at university.

Additionally, a female engineer from Rio Tinto or a female engineering student from UWA may also give a short presentation about their journey to becoming an engineer and why they think there needs to be more females in engineering.

Volunteers will then run a 1—2 hour interactive engineering activity with students.

<table>
<thead>
<tr>
<th>School</th>
<th>Number of workshops</th>
<th>Total students</th>
<th>Year groups</th>
<th>UWA volunteers</th>
<th>Rio Tinto volunteers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belmont City College</td>
<td>4</td>
<td>105</td>
<td>7,8,9 &amp; 10</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Governor Stirling Senior High School</td>
<td>2</td>
<td>63</td>
<td>7,8,9 &amp; 10</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>John Wollaston Anglican Community School</td>
<td>3</td>
<td>100</td>
<td>7,8,9 &amp; 10</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>La Salle College</td>
<td>2</td>
<td>62</td>
<td>7,8,9 &amp; 10</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Methodist Ladies College</td>
<td>4</td>
<td>119</td>
<td>8 &amp; 9</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Penrhos College</td>
<td>10</td>
<td>229</td>
<td>7, 8 &amp; 9</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>Perth College</td>
<td></td>
<td>235</td>
<td>8, 9 &amp; 10</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>St Hilda’s Anglican School for Girls</td>
<td></td>
<td>113</td>
<td>9</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>St Mary’s Anglican Girls College</td>
<td></td>
<td>113</td>
<td>7,9 &amp; 10</td>
<td>3</td>
<td>3</td>
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<td>7,9 &amp; 10</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

*9 of 11 schools were able to accommodate in-school visits in 2015.
After attending the GiE day, a female student returned to school and has changed their enrolment from the specialist netball program into their specialist engineering program.

The schools reported the content is pitched at the right level and the 15 minute activities are concise so that students are kept engaged during the entire workshop.

Students have asked when GiE are coming back!

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**Girls in Engineering 2015 in-school activities overview**

The GiE program has achieved the following during 2015:

- 1,481 students have been engaged in GiE workshops and events
- 43 in-school workshops have been delivered
- 15 industry professional presentations
- 1,146 students have been engaged during in-school workshops
- Partnerships have been formed with 11 high schools
- 335 girls have participated in our on-campus activities

Before participating in our workshops 67% of students did not know what engineers did but after our workshops, 94% of students reported that the workshops taught them a lot about engineering.

51% of students were inspired to become an engineer after participating in one of our workshops.

During our workshops and events 33 UWA Engineering Students and 32 Industry Professionals have helped engage high school students.

**Impacts within our partner schools:**

- One school reported that enrolment in their Specialist Maths program has increased by 500%, from 4 to 24 students!
- Another school has initiated an extension program through the UWA Faculty of Engineering, Computing and Mathematics for their A students
- After attending the GiE day, a female student returned to school and has changed their enrolment from the specialist netball program into their specialist engineering program
- The schools reported the content is pitched at the right level and the 15 minute activities are concise so that students are kept engaged during the entire workshop
- Students have asked when GiE are coming back!

**Feedback from students:**

“This program is extremely useful. I had no interest in engineering and did not know anything about it prior to today. I am now considering it as a career”

“I am now considering biomedical and chemical engineering. I now enjoy problem solving”

“I really enjoyed the hands on experience and learning about what an engineer does”
School visit - before and after comments

At one school, GiE asked the students what an engineer does at the beginning of the session and again at the end of the session.

The before and after responses of some students are recorded in the table to the right.

<table>
<thead>
<tr>
<th>What do you think an Engineer does?</th>
<th>Based on today’s session, what do you think an engineer does?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hard math, build bridges and other architecture, mining things.</td>
<td>Design solutions to solve problems.</td>
</tr>
<tr>
<td>I think an engineer does complicated math.</td>
<td>Someone who designs solutions to solve problems.</td>
</tr>
<tr>
<td>They design and engineer stuff.</td>
<td>An engineer designs solutions to problems.</td>
</tr>
<tr>
<td>They engineer and design things.</td>
<td>Based on today’s session I would say that an engineer creates things that make life easier and solve problems throughout the world.</td>
</tr>
<tr>
<td>They create new inventions and fix things.</td>
<td>Creates new inventions to make things easier (designing solutions).</td>
</tr>
<tr>
<td>Intense mathematics and making things.</td>
<td>They design solutions to solve problems.</td>
</tr>
<tr>
<td>They can create stuff, fix things.</td>
<td>Designs solutions to ideas.</td>
</tr>
<tr>
<td>An engineer plans infrastructure and organises how buildings and machinery are being built.</td>
<td>Inspiration to help solve these problems.</td>
</tr>
<tr>
<td>A person that works in developing equipment to change how the world works or keep it running.</td>
<td>They solve problems and use nature as an inspiration to help solve these problems.</td>
</tr>
<tr>
<td>Making or fixing things.</td>
<td>Someone that uses their knowledge to solve problems in daily life.</td>
</tr>
<tr>
<td>An engineer solves problems in today’s society so the world will be more efficient.</td>
<td>An engineer solves problems and use nature as an inspiration to help solve these problems.</td>
</tr>
</tbody>
</table>
On-campus activities

On Thursday 2 July 2015, 175 female students from nine of the GiE partner schools came to UWA for a day of engineering inspired activities. The girls rotated through 3-4 different activities which included:

- How to solve a Rubik’s cube; which teaches problem solving, patience and persistence and helps develop spatial visualisation and memory
- Bridge building; an activity delivered by Engineers Without Borders (EWB)
- Egg drop: constructing a package from limited material that will protect an egg when dropped from a height, delivered by the University Engineers Club (UEC)
- Programming robots; an activity delivered by Robogals
- Speed networking; a group activity, where students rotate through stations and have 5 minutes at each to talk to two current engineering students, two UWA engineering academics and two professional Rio Tinto engineers.

The activities are designed to introduce the students to the different areas of engineering and to excite them about a possible career in engineering. It is also an opportunity for the students to experience the university campus and meet current engineering students and professional engineers.

Fifteen UWA engineering students, two UWA engineering academics, four Aspire UWA staff and five Rio Tinto engineers helped on the day.

On Thursday 5 November 2015, 160 female students from eight of the GiE partner schools came to UWA for a day of engineering inspired activities. The girls rotated through 3-4 different activities which included:

- How to solve a Rubik’s cube; teaching problem solving, patience and persistence and helps develop spatial visualisation and memory
- Renewable energy; an activity delivered by Engineers Without Borders (EWB)
- Egg drop; constructing a package from limited material that will protect an egg which will be dropped from a height, delivered by the University Engineers Club (UEC)
- Constructing a stable platform; an activity delivered by Society of Petroleum Engineers UWA (SPE UWA)
- The Spectacular Physics Show; delivered by Giuseppe Coletti and the UWA Physics Department
- Game theory and logic; delivered by the UWA Mathematics Outreach Committee

Students were asked to provide feedback on their preferred activity. The Egg drop, Rubik’s cube and Physics Show activities were the most favoured.

Robogals Partnership

An exciting concept has been designed by GiE and developed into posters and stickers to share with primary age students. GiE has partnered with Robogals to distribute the materials to primary schools.

The concept of a female engineering superhero has been developed to show that girls can take on real world challenges. The tagline for this campaign is simply “Be a Hero, Be an Engineer” and is aimed at building awareness from a young age that females can become engineers.

The posters and stickers have been distributed to Robogals chapters around Australia. The following chapters will give out the resources to the following numbers of students during their school visits:

Perth: 1800
University of Tasmania: 40
University of NSW: 800
University of QLD: 1000
Australian National University: 700
Toowoomba: 1000

Website

The program has evolved this year to develop its own look and feel. This has been a necessary transition to create a unique identity that demonstrates the aims of the program and characterises our efforts. A webpage has been developed as an information portal and resource for stakeholders and interested parties of the program.

The website will be launched at the end of 2015 and shared with all those involved and interested in GiE.

www.ecm.uwa.edu.au/gie
The University of Western Australia's Girls in Engineering (GiE) program is proudly supported by:

RioTinto

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