

techgirls» movement FOUNDATION

2021 Techgirls Competition Evaluation Report

Tech Girls Movement Foundation Ltd

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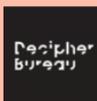
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Table of Contents

Overview of the Report	3
Overview of the Competition	3
Key Findings	3
Students	4
Mentors	4
Coach	5
Student Pre Survey	9
Statements prior to the competition	10
Student Post Survey	11
Statements after completing the competition	11
Mentor Pre Survey	16
Motivation to Mentor	16
Mentor Post Survey	18
What worked well	18
Coach Pre Survey	20
Gain by participating	20
Coach Post Survey	22
What worked well	22
What didn't work well	23
Participate again in the competition?	25
Like to know beforehand	26
Advice for future coaches	27

Overview of the Report

This report presents the results of the evaluation of the 2021 Techgirls competition, based on pre and post surveys with students, coaches, and mentors. Aligned with international research the report was conducted and analysed by the Tech Girls Movement Foundation team led by Dr Jenine Beekhuyzen OAM (CEO). The study replicates and builds on previous years allowing a longitudinal comparison. Available via the competition portal, the surveys have a mix of open and closed questions, and they are designed to measure the change in perceived skills and knowledge of young people engaged in STEM entrepreneurship. The cohorts are surveyed prior to the program, and again in the final week of the program as students submit their deliverables for judging.

Overview of the Competition

The Tech Girls Movement Foundation has a vision of a society in which girls confidently lead in STEM entrepreneurship and contribute to their community and the economy. We do this by championing Australian school girls using hands-on learning to transform their futures and encourage equity in the technology industry. We help girls to get excited and connected with technology in a way that is meaningful and life-changing, and we aim to give every girl the opportunity to participate in tech girls' activities and realise their potential to lead.

The annual Techgirls competition (renamed from the Search for the Next Tech Girl Superhero in 2019) began with 16 students in 2014, and it has grown to include 1000 students per year. We have engaged more than 12 000 girls in our hands-on program over eight years. To date, we have had over 40 winning tech girls teams as Ambassadors visiting Silicon Valley in the USA to pitch their ideas and apps.

This award-winning program is based on 20 years of research on gender, diversity, STEM, and entrepreneurship. Through the program, we have reached thousands of schools, both online for the competition and face-to-face for classroom workshops. Hundreds of teachers have participated, and 1000+ industry female mentors have participated in the program, volunteering tens of thousands of hours to their teams over the past eight years. A conservative estimate of the time dedicated to the program in 2021 is 10 000 hours by teams, coaches, mentors, judges, and the Techgirls team.

Key Findings

A few points from this year's competition are particularly compelling. First of all, more teams reached completion of the program and submitted their final projects for judging than in years past. Based on feedback from students, coaches, and mentors, we suggest this is due to the stronger clarification of expectations, clear weekly goals and tasks outlined, and greater access to all resources, in part because of this year's use of Blackboard for the second time as an organisational platform.

Significantly, this rate of completion was achieved during a year when teams had to contend with lockdowns and online learning; success in the face of such adversity certainly speaks to the resilience and persistence of all those involved in Techgirls 2021! Interestingly, a high rate of students indicated the feeling of disappointment because they could not meet in face-to-face settings. The COVID pandemic's lockdown procedures prevented many students from being able to work cohesively as a live group. This

highlights how powerful the human element is to effective teamwork; despite the wonders of technology like Zoom and Teams, live, human interaction is always going to be most powerful.

Finally, it is also noteworthy how overwhelmingly positive the response was to the program's effectiveness and overall benefits to a range of aspects, from equipping girls with the tools to start their own businesses and work in technology to growing their confidence and inspiring them to achieve their goals. Coaches, mentors, parents, teachers, and most importantly, the student participants, all provided glowing feedback on the Techgirls program and exalted its merits. This certainly bodes well for the future of the program, as we head towards our tenth year in operation in 2023.

Students

- The top 6 most valued parts of the program are: Teamwork, Business plan, Planning your app and code, Logos and colour design, Branding, and the Pitch
- Students are marginally more likely to consider a career in science or technology after the competition
- Almost half agree they like to watch television shows about science or technology
- Confidence in developing new ideas with technology grew after the competition
- Three-quarters of students enjoy learning about science
- More than half plan to use science or technology for their future careers
- Less than half felt their parents would like it if they chose a science or computing career
- Nearly three in four like their science classes
- Nine out of ten students felt more comfortable using computers after the competition
- More than two-thirds of students cope at least ok with not doing well on science and technology assignments
- More than two-thirds know people who work in science and/or computing
- Four out of five students felt they had sufficient resources to be a successful participant in the competition
- Only a few students reported not understanding their science and technology subjects
- Most understood or were open to the idea that learning a lot about technology enables them to pursue many different types of careers
- Most teams felt they worked well together, and coaches provided the support teams needed
- Four out of five teams felt their mentors provided support and the direction the team needed
- Students are now more likely to think they need to know about science and technology to get a good job

Mentors

What worked well

- A general increase in girls' confidence
- Expectations about the program were clear
- Blackboard helped all involved to be organised
- Great support from the school coach and teachers

- The girls had great enthusiasm, impressive skills, and were committed until the end
- The program is easy to follow and implement
- The program provides significant value to all involved
- There is an effort to involve parents
- Generous support and guidance from the Techgirls team
- The weekly structure of the program helped to keep everyone on track

Coach

Gain by participating

- Increasing the confidence and enthusiasm of their students
- Supporting students explore STEM and entrepreneurship
- Provide opportunities to foster STEM skills
- Build a STEM school culture
- Support STEM career choices
- Own personal development

What worked well

- Expectations were clearly communicated by Techgirls
- Outstanding support from the Techgirls team
- The curriculum content was engaging
- Mentors are a valuable part of the program
- Students collaborate to solve problems they care about
- A regular cadence with meetings and resources
- Support to students from our student ambassador

What didn't work well

- Time management
- Scheduling mentor meetings
- Blocked internet access in schools
- Limited access to Blackboard for all team stakeholders
- Lockdown! No in-person meetings
- Supporting multiple teams and their commitment levels
- Getting it all done
- Technical challenges
- Too much in the curriculum

Why would you participate in the competition again?

- A great learning experience
- Seeing student's confidence grow significantly as a result of the competition
- Students really enjoy the real-world challenge

Would like to know before the competition

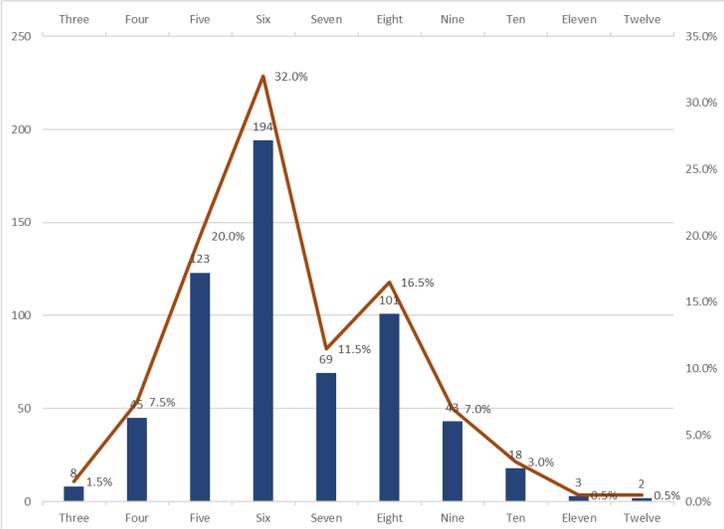
- How much work and time is involved
- The date of the final showcase event
- Which programs would be used for coding

Advice for future coaches

- Get up to speed on the competition requirements and team dynamics early
- Closely monitor progress and milestones
- Start early and use the online resources
- Be mindful of the time you have available
- Spend time trying to develop your own skills
- Believe in your own capabilities
- Trust in the student's capabilities
- Share the coach role if possible

Research Cohort

In 2021, 153 teams registered in the competition from across Australia and New Zealand, consisting of 606 students from 56 schools: 93 primary and 60 secondary school teams. There were 31 public schools, 25 private/independent schools. 52% of schools who participated in 2021 have previously participated in the Techgirls Competition. 123 teams submitted their projects for judging. Grade 6 had the highest number of registrations.



80.5% of teams (123) made up of 507 students submitted their final project for judging. 19.5% of teams (30) made up of 99 students did not submit their final project. This is a higher rate of submission than has occurred in previous years.

Each team has a coach—a teacher or parent—to guide them through the program. In 2021 there were 65 coaches. 24 coaches had participated in previous years.

147 female STEM industry mentors, representing 75 STEM industry workplaces, were matched with teams. 29 mentors who participated as mentors had previously volunteered their expertise to the program in 2021.

108 industry judges (women and men) helped with 123 competition submission entries. Each entry was judged by at least 3 industry judges.

We had mostly Australian teams, with 1 New Zealand team. New South Wales had the most teams by State, followed closely by Queensland.

2021	Mentors	Coaches	Students
Total participants	147	65	606
Pre responses	137	59	59
Post responses	59	43	415

Student Pre Survey

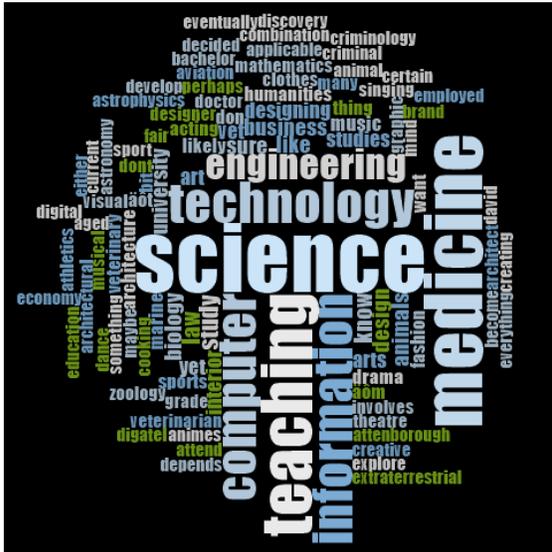
415 students completed the pre-competition survey: they were most heavily represented in NSW (46%), followed by Qld (27.5%), Vic (16%), Tas (5%), WA (3%), SA (1.5%), NZ (1%). 60% of students were from co-educational schools, and 40% were from single-sex schools. Most students attended independent schools (41.5%), followed by public schools (35%), and catholic schools (21.5%), and 2% were unsure. Students were enrolled across Year 3 to Year 10, with most students in Year 6 (38%), followed by Year 8 (16.5%), and Year 5 (16%). 86% of those students had not participated previously in the Techgirls competition; 14% had. Prior to the competition, 24% of responding students had participated in an Academy for Enterprising Girls (AEG) workshop (another Techgirls program).



School activities

Students reported a variety of ICT activities that their school engages in. Most notably, competitions like Techgirls, coding clubs, excursions, and engaging with guest speakers.

Students reported wanting to study science (24%); medicine (20%); teaching (17%); technology (12.5%); and computers (11.5%), among other things at university.



Statements prior to the competition

Students ranked their **coding knowledge prior to the competition**, with 12% reporting *not much*, 25% reported *very little*, 37% reported *average knowledge*, 23% reported *some coding knowledge*, and 3% reported *a lot*.

Less than half considered a career in science or technology

I am considering a career in science or technology: 42% *strongly agreed or agreed*, 36% were *neutral or had no opinion*, and 22% *disagreed or strongly disagreed*.

Less than half liked to watch tv shows about science or technology

I like to watch television shows about science or technology: 48% *strongly agreed or agreed*, 29% *neutral or had no opinion*, and 23% *disagreed or strongly disagreed*.

Just over a third expect to start their own business, and only one in five disagreed

I expect to start my own business: 37% *strongly agreed or agreed*, 44.5% were *neutral or had no opinion*, and 18.5% *disagreed or strongly disagreed*.

Nearly two-thirds are confident about developing new ideas using technology

I am confident about developing new ideas using technology: 63% *strongly agreed or agreed*, 30.5% were *neutral or had no opinion*, and 6.5% *disagreed or strongly disagreed*.

Three quarters enjoy learning about science

I enjoy learning about science: 76% *strongly agreed or agreed*, 17% were *neutral or had no opinion*, and 7% *disagreed or strongly disagreed*.

Four out of five students enjoy learning about technology

I enjoy learning about technology: 81.5% *strongly agreed or agreed*, 13% were *neutral or had no opinion*, and 5.5% *disagreed or strongly disagreed*.

Over two-thirds reportedly do well in science subjects

I do well in science subjects: 70.5% *strongly agreed or agreed*, 24% were *neutral or had no opinion*, and 5.5% *disagreed or strongly disagreed*.

Nearly three quarters reportedly do well in technology subjects

I do well in technology subjects: 72.5% *strongly agreed or agreed*, 23.5% were *neutral or had no opinion*, and 4% *disagreed or strongly disagreed*.

Just over half plan to use science or technology in their career

I plan to use science or technology in my career: 56% *strongly agreed or agreed*, 32% were *neutral or had no opinion*, and 12% *disagreed or strongly disagreed*.

Less than half believe their parents would like it if they chose a science or computing career

My parents would like it if I choose a science or computing career: 42.5% *strongly agreed or agreed*, 49% were *neutral*, and only 8.5% *disagreed or strongly disagreed*.

Four out of five like their science classes

I like my science classes: 78% (*strongly agreed or agreed*), 14.5% were *neutral or had no opinion*, and 7.5% *disagreed or strongly disagreed*.

Nine out of ten students feel comfortable using computers

I feel comfortable using computers: 88% *strongly agreed or agreed*, 9.5% were *neutral or had no opinion*, and 2.5% *disagreed or strongly disagreed*.

Four out of five students are coping ok or well with not doing well on science and technology assignments

Students were asked **how well they can cope with not doing well on science and technology assignments** and 14% reported *coping very well*, 33% *coping well*, 32% *coping ok*, 13% *barely coping*, and 8% *not coping well*.

Two-thirds know people who work in science and technology

I know people who work in science and technology: 64.5% (*strongly agreed or agreed*, 20% were *neutral or had no opinion*, and 15.5% *disagreed or strongly disagreed*).

Only one in five disagreed that they need to know about science to get a good job

I don't need to know about science to get a good job: 19% *strongly agreed or agreed*, 42.5% were *neutral or had no opinion*, and 38.5% *disagreed or strongly disagreed*.

Over half agree they need to know about technology to get a good job. Only one in eight disagreed.

I don't need to know about technology to get a good job: 13% *strongly agreed or agreed*, 35% were *neutral or had no opinion*, and 52% *disagreed or strongly disagreed*.

Student Post Survey

Students responding represented a **fairly even mix of public, private (independent), and catholic schools**. Some students were enrolled in distance education programs, and some were homeschooled. 138 were from co-educational schools, and 93 were from single-sex schools.

Statements after completing the competition

Students are marginally more likely to consider a career in science or technology after the competition.

While students are not more likely **to consider a career in science or technology after the competition**, per se, there was a 4% increase in the neutral responses and a 3% decrease in those disagreeing with this statement. Pre-competition, students were asked if they are likely to consider a career in science or technology after the competition, and less than half considered a career in science or technology. Post-competition - considering are you now more likely to consider a career in science or technology - while 1% no longer agreed, there was a 4% increase in the neutral responses and a 3% decrease in those disagreeing they responded. 41% *strongly agreed or agreed*, 40% were *neutral or had no opinion*, and 19% *disagreed or strongly disagreed*.

Almost half of the students agree they like to watch television shows about science or technology.

I like to watch television shows about science or technology: 48% *strongly agreed or agreed*, 29% *neutral or had no opinion*, and 23% *disagreed or strongly disagreed*. There were no visible changes from the pre-survey.

Students are not more likely to start their own business

When asked if they were **now more likely to start their own business**, 37.5% *strongly agreed or agreed*, 42% were *neutral or had no opinion*, and 20.5% *disagreed or strongly disagreed*. This response had very little change from the pre-survey where 37% *strongly agreed or agreed*, 44.5% were *neutral or had no opinion*, and 18.5% *disagreed or strongly disagreed*.

Confidence in developing new ideas with technology grew after the competition.

There was clear confidence growth among the cohort. When asked if they are **now more confident about developing new ideas using technology**: 68% *strongly agreed or agreed*, 23% were *neutral or had no opinion*, and 20.9% *disagreed or strongly disagreed*. In the pre-survey, 62% *strongly agreed or agreed*, 30.5% were *neutral or had no opinion*, and only 7.5% *disagreed or strongly disagreed*.

Three-quarters of students enjoy learning about science

76.5% of students *strongly agreed or agreed* that they **enjoyed learning about science**, 18% were *neutral or had no opinion*, 5.5% *disagreed or strongly disagreed*. There were no obvious changes visible from the pre-survey responses.

Three-quarters of students enjoy learning about technology

76% of students *strongly agreed or agreed* that they **enjoyed learning about technology**, 19% were *neutral or had no opinion*, 5% *disagreed or strongly disagreed*. There was no visible shift in perceptions from the pre-survey.

More than half plan to use science or technology for their future careers

I plan to use science or computing in my future career: 53% *agreed or agreed*, 40% were *neutral or had no opinion*, and 7% *disagreed or strongly disagreed*. This shifted slightly post-competition with 56% *strongly agreeing or agreeing*, 32% were *neutral or had no opinion*, and 12% *disagreed or strongly disagreed*.

Less than half felt their parents would like it if they chose a science of computing career

When asked if their **parents would like it if I choose a science of computing career**: 44% *strongly agreed or agreed*, 45.5% were *neutral or had no opinion*, and only 10.5% *disagreed or strongly disagreed*. There was no visible shift in perceptions from the pre-survey.

Nearly three in four like their science classes

I like my science classes: 73.5% *strongly agreed or agreed*, 18% were *neutral or had no opinion*, and 20.8.5% *disagreed or strongly disagreed*. Similar patterns were observed in the pre-survey.

Nine out of ten students felt more comfortable using computers after the competition.

Post competition, 88% of students **felt more comfortable using computers**, 10% were *neutral*, and only 2% *did not feel more comfortable* using computers.

More than two-thirds of students cope at least ok with not doing well on science and technology assignments.

There was a shift in how well students can cope with not doing well on science and technology assignments. After the competition they appeared to cope less well with 8.5% (down from 14%) reported to be *coping very well*, 29% (down from 33%) *coping well*, 32% (same) *coping ok*, 19.5% (up from 13%) *barely coping*, and 11% (up from 8%) *not coping well*. This lessened ability to cope could be explained by the fact that more than 80% of teams were in region-wide lockdowns for most of the competition schedule. Students reported frustrations with not being able to meet in person to work toward deadlines and the challenges in preparing some of the deliverables such as the team video where traditionally team members would record it in person.

More than two-thirds know people who work in science and/or computing.

When asked if they **know people who work in science and/or computing**, 68% *strongly agreed* or *agreed*, 20% were *neutral* or *had no opinion*, and 12% *disagreed* or *strongly disagreed*. There were no major changes in perceptions.

Four out of five students felt they had sufficient resources to be a successful participant in the competition.

Students overwhelmingly agreed they **had sufficient resources to be a successful participant in the competition**: 34% *strongly agreed*, 44% *agreed*, 18% were *neutral* or *had no opinion*, 3% *disagreed*, and 1% *strongly disagreed*.

Only a few students reported not understanding their science subjects

I understand science subjects: 80% *strongly agreed* or *agreed*, 16.5% were *neutral* or *had no opinion*, and 3.5% *disagreed* or *strongly disagreed*.

Only one in 20 students reported not understanding their technology subjects.

I understand subjects involving technology: 76.5% *strongly agreed* or *agreed*, 19.5% were *neutral* or *had no opinion*, and 4% *disagreed* or *strongly disagreed*.

Most understood or were open to the idea that learning a lot about technology enables them to pursue many different types of careers.

If I learn a lot about technology, I will be able to pursue many different types of careers: 71% *strongly agreed* or *agreed*, 24% were *neutral* or *had no opinion*, and 5% *disagreed* or *strongly disagreed*.

Most teams felt they worked well together

Overwhelmingly students felt **their teams worked well together**: 82% *strongly agreed* or *agreed*, 12.5% were *neutral* or *had no opinion*, and only 5.5% *disagreed* or *strongly disagreed*.

Overwhelmingly, coaches provided the support that teams needed

Coaches provided the support that teams needed: 85.5% *strongly agreed* or *agreed*, 11% were *neutral* or *had no opinion*, and only 3.5% *disagreed* or *strongly disagreed*.

Four out of five teams felt that their mentors provided the support and direction that their team needed

Overwhelmingly, **mentors provided the support and direction that teams needed**: 82% *strongly agreed* or *agreed*, 10.5% were *neutral* or *had no opinion*, and only 7.5% *disagreed* or *strongly disagreed*.

There was a positive shift in student beliefs that need to know about science to get a good job

They felt they **do need to know about science to get a good job**. After the competition, 19% *strongly agreed* or *agreed*, 37% were *neutral* or *had no opinion*, and 51% *disagreed* or *strongly disagreed*. Prior to the competition, only 14% *strongly agreed* or *agreed* 31% were *neutral* or *had no opinion*, and 55% *disagreed* or *strongly disagreed*.

Students are now more likely to think they do need to know about technology to get a good job.

Student perceptions shifted when asked - **I don't need to know about technology to get a good job** - Students strongly agreeing or agreeing increased by 2% to 15%, those neutral decreased by 4% to 31%, and those that disagreed or strongly disagreed decreased 3% to 54%.

When students were asked **why they like science and technology**, most reported that they either “love science” or “love technology” as they perform well in these areas, or they had good teachers, or they were influenced by peers.

“I have older friends who are Digital Technologies teachers at schools, who are not only about learning but more about doing. They believe in interactive learning in robotics and computing and find ways to engage us.”

“I have always enjoyed science and technology subjects and have been able to increase my knowledge in these areas through a nomination in other programs like Brainways and STEAM. Attending these programs has helped me further enjoy learning about science and technology.”

“Science fascinates me a lot. I haven't had too much experience with technology, but I would like to learn more. I do not have any set plans for my career and I am open to new opportunities in other fields.”

“My dad works as an anaesthetist and my family has always loved science. I want to pursue a career in which I can help people and the environment, and learning about science and technology is an essential step towards gaining the knowledge I need to help.”

“I do really well in science as a subject at school however I'm not overly interested in it or planning to take my career path to become a scientist. I'm good with a computer but not so confident about coding so I think this will be a good chance for me to get better.”

“I chose those because I love tech and I want to learn more so I can change the world.”

Coding knowledge

Students were asked about their knowledge of coding prior to the competition and it was compared to their perceived knowledge of coding after completing the competition. After the competition, 5% (up from 3%) reported *a lot* of coding knowledge, however, 18% (down from 23%) reported *some* coding knowledge, 28% (down from 37%) reported *average knowledge*, 32.5% (up from 23%) reported *very little*, and 17% (up from 12%) reported *not much* coding knowledge. While we may expect their coding knowledge to have improved after the competition, a shift in the perception of what coding skills are may have changed in the students during the competition. One explanation for this, based on the open-ended responses about challenges faced in the program, is that many students had basic prior experience with coding through programs like Scratch at school, and they ranked their coding knowledge on this experience. When faced with more advanced coding challenges in the competition, they re-evaluated their coding knowledge, acknowledging a deeper appreciation for what coding knowledge and skills are and ranking themselves in what may be considered a more accurate ranking.

Another explanation is that not all students participate in the Techgirls program to extend their coding knowledge (it is not the primary goal of the program). We find that most teams assign students based on their strengths and passion areas. Often one or two girls in the team take on the coding role so others in the team may not feel they gained any further knowledge.

Students were asked which parts of the competition curriculum they found most useful. They reported:

- Teamwork (112)
- Business plan (105)
- Planning your app and code (67)
- Logos and colour design (63)
- Branding (63)
- The pitch (62)
- Wireframing (53)
- Brainstorming (40)
- Skills matrix (25)
- Marketing (24)
- Problem identification (23)
- Finance (22)
- Finalising your videos (10)
- User-centred design (2)

Students were asked to elaborate on the **parts of the program they liked the most:**

“We had trouble with the business plan. We didn't really understand what some of the questions were asking and we also had some difficulty with the wording. But I feel that I learned a lot by completing the business plan with my team.”

“I had a lot to learn in terms of video editing but through the last couple of weeks of the competition I learned much more about this.”

“I enjoyed thinking and creating our app design but I think we could have focused a little more on time management.”

“I really liked the competition because I got to build a really cool app with all my friends. What I didn't like was having to do the rest of the competition in lockdown.”

“I really liked this competition as it gave us the space and opportunity to come up with our own ideas and manage how we get those ideas across to others. I think the work level and amount of work was perfect for our year level which made things exciting and meant we had to work hard but also meant we didn't get overworked or stressed. Overall it was a really enjoyable experience and we hope our product does well!”

“I like participating in tech girls because it gives me the opportunity to further my skills, particularly on the business side as business and marketing is my weakness.”

“I really liked the new experiences learned, meeting a mentor with lots of skills/experience and generating a meaningful app. I found it really cool as I've always been interested in app creation but have never known how it works.”

Students reported on **difficulties they faced in completing the tasks set for them**. While they were challenged with tasks they had not encountered before which were complicated by being in lockdown during the pandemic, many found creative solutions to address them.

“Even though I hadn't done some of this work before, we were able to work through each activity as a team and learn along the way.”

“The finances as I had not been exposed to these areas before.”

“It was quite challenging for us to choose where to make our customers spend money on our app due to how our topic of how the app is supposed to decrease the number of asthma attacks existing.”

“The only difficulty was the changes in our team near the end of the competition.”

“We had trouble doing our videos as we are all in lockdown and are unable to meet to do the pitch video. We ended up finding a fun and entertaining way to do it.”

“I had a lot to learn in terms of video editing but through the last couple of weeks of the competition, I learned much more about this.”

“I think the element that I found most difficult was completing the business plan before the deadline!”

Mentor Pre Survey

In the pre-survey, the 137 mentors were most represented in NSW (40%), Qld (27%), and VIC (26%), and less so in WA (4%), NZ (1%), SA (1%), and ACT (1%). More than half work in a large enterprise (52%); 17.5% in an SME; 11.5% in government; 11% in education; 4% run their own company; and 2% in others. They are mainly working in the IT/Telecommunications sector (55.5%); education (9%), Finance (1%); legal (0.5%); and others. The majority are consultants (17.5%); in Sales/Marketing (10%); IT Managers (10%); University/Academics (8%); and Programmer/Analysts (7%).

7% of mentors participated in the Techgirls competition in 2020, and 7 of them mentored a team in 2019; 4 in 2018; 3 in 2017; 2 in 2016; and 1 back in 2014 in the first year of the competition.

Motivation to Mentor

Mentors were asked what they were hoping to gain by participating as a mentor in the competition. Most wanted to give back and pass on all that they could by “increasing the footprint of impact I can have on the next generation of thinkers” and “I hope that I can encourage more women to dive in and reap the professional and personal rewards as I have.”

Some took it also as a learning opportunity, “learning alongside younger girls, the opportunity to share my experiences, encourage girls to take up engineering/trade careers/understand blockers that may prevent girls entering the workforce in a STEM career.”

For some, it was purely about inspiration: “an opportunity to impact at least one person’s thinking and inspire them to realise the potential of a career in tech.”

“I would love to inspire even one girl to explore a career in technology, and if I can share my experience and knowledge that I have learned from being a founder to do so, I would be overjoyed. I have worked with young girls in my previous life as a gymnastics and dance coach and loved being able to help those girls thrive at doing what they love. Since I progressed later into my career I haven't been able to have the same impact so far but would love to try to make a difference in a program like Tech Girls Movement Foundation if my skills would be valuable!”

For some, inspiration worked the other way: “I hope to be inspired by the capabilities of Tech Girls.”

Being an active role model motivated some: “When I was in primary school, there were very few (if any) female role models in STEM who I could look to and go “wow, I want to be like her.” This meant I spent many years being uncertain in both my capabilities and the career options available to me as someone interested in science and maths.”

“When I was a young girl and especially a young girl from a migrant background, I had very few examples of older women who looked like me that were established in their career and what kind of career paths they were taking. If I can somehow show young girls who are of a similar background to me, that this is an amazing and important career path for the future - I would love the opportunity to do so. I'm also a part-time student in a completely different industry as well, so showing these young girls that you can really do anything that you set your mind to, would be such a fulfilling opportunity as well.”

Interestingly, not all mentors had formal qualifications in STEM, and this motivated them to mentor, “Even though I haven't studied Tech/STEM I have still managed to gain a fulfilling career in tech and in the meantime taught myself tech. It's not as daunting as people think it is. The more I can encourage women/girls the more normalised it will be.”

For some, it was about creating opportunities for young people as well as for themselves, “I hope to gain a sense of pride in seeing young girls achieve things that they may have thought were out of reach for them previously. In doing this I look forward to seeing them flourish and see a world of possibilities open up to them.”

“Techgirls program will provide me with an opportunity to help the younger generation learn how technology is embedded in our everyday lives and how they can be the future of innovation by developing technical skills early in their lives. Technical skill is no longer a skill that some should aspire to possess. It's an essential skill that all of us should have these days. Women are still significantly underrepresented in STEM fields, making it is even more important to show girls, in particular, that learning technical skills is not only beneficial, but it can also be a lot of fun. This is also an equally valuable learning opportunity for me.”

Others felt that the competition was an opportunity for a much longer and deeper connection with the next generation: “Satisfaction of seeing a team achieve more than they thought possible, and to strengthen their self-awareness and self-worth.”

“I have used my roles in senior management to create jobs in the Australian Market in IT and contribute to hiring, recommending, mentoring, rotating and planning successful career progression for women in STEM. By way of this program, I want to contribute back to society and create lifelong connections.”

Some took the mentoring role as an opportunity to challenge outdated gender stereotypes and norms: “I would love to see more young women inspired to do the jobs we have been taught are not for us. This is

the next generation of leaders, and we need to support them when it comes to gaining confidence to take those strides as women in technical roles.”

Mentor Post Survey

In the post-survey, the 54 mentors were most represented in QLD (29.5%), NSW (39%), VIC (22%), ACT (2%), SA (2%), WA (5.5%). More than half (52%) work in large enterprises; 18.5% in SME's 13% in education; 11% in government; and 5.5% own their own company. More than half (57.5%) work in the IT/Telecommunications **sector**; 11% in the education sector, and others across finance, science, defence, legal, professional services and other sectors. Mentors work in a **variety of roles** from programming/analyst (9%); sales/marketing (8%), consultants (6 =%); IT Managers (5%); business owners (4 %); and many others.

72% reported that they would **participate again as a mentor** in the Techgirls Competition; 26% said maybe, and only one person (2%) said no. 31.5% of mentors have **participated in the Techgirls program previously**; 68.5% had not. 91% reported that their **teams submitted their final entries in 2021**; 5% had teams that did not, and 4% mentored more than one team of which some submitted and some did not.

What worked well

Mentors were asked what worked well in the competition. One replied: “Almost everything :)”. Another reported: “getting to know the girls” as the best part of the program. Many mentors really connected with their teams and coaches and had a rewarding experience: “I really liked my techgirls team. They were smart, amazing, energetic and hard-working during the whole project. I was honoured to work with them. Their coach was also very nice and helpful.”

A general increase in girls' confidence

“I believe this program has helped the girls gain more confidence in their skills in problem-solving, communication, collaboration, and creating a business plan.”

“That the girls are prompted to come up with their own ideas, which gives them a great sense of ownership and motivates them well.”

Expectations about the program were clear

“The organisation to help the mentors know what to do is excellent.”

“Clear expectations for the program - deliverables and timeline.”

“The structure worked well in that it gave us good guidance around where we should be up to at the various weeks of the competition.”

Blackboard helped all involved to be organised

Techgirls uses Blackboard to host the 12-week curriculum and communications with the team, coach, and mentors.

“I thought Blackboard was fantastic. I hadn't had to use it prior to this year's competition.”

“Blackboard gave us a really great platform to collaborate.”

“The Blackboard site was very useful in finding information and resources/activities to support the girls in the research, design, and development of the app they were creating. My team was very dedicated, and put in a lot of effort each week to ensure they achieved and met the deliverables required.”

Great support from the school coach and teachers

“Coaches were great! The girls loved it all.”

“Having the weekly sessions booked in by the teachers was good. Having the clear due date and clear deliverables were good.”

“In-person catch-ups. These were so valuable for both students and mentors.”

The girls had great enthusiasm, impressive skills, and were committed until the end

“Very willing and able students who have access to tech and advisors.”

“The girls were excellent at using digital technologies to collaborate!”

“The team I worked with did great, still following along with all the meetings being virtual.”

“The girls are amazing in their capabilities and capacity to understand new concepts and apply different methodologies, quite outstanding really.”

“The girls were all enthusiastic and really smart and impressive. They coordinated and worked well together despite being in different states and through a lot of stress factors i.e. the pandemic, and I'm proud of them for the entry they put together.”

The program is easy to follow and implement

“The ability to meet with the girls and collaborate on a project was really great. Although the materials provided in the Techgirls Bb site and the drop-ins, etc. looked really good and thorough, I didn't seem to require them, so I didn't use them. As far as I could tell, the girls and the teacher didn't access them a lot either... but I think it is good that they are there to help those that feel they need it. For me, this was a time issue and I suspect it was similar for the girls and their teacher. It was also really nice that the school was located in the same suburb where I live, so it was a 5-minute car ride to the school.”

“[The] business plan template is great.”

“The information provided was great, very well put together!”

“Weekly catchups, remote format.”

The program provides significant value to all involved

“The learning outcomes are wonderful.”

“I loved working with my team this year. The girls were very engaged and worked well as a team and their coach was equally invested. The structure of the programme worked well to assist them in getting to the end goal.”

“Weekly updates on Blackboard, and the extremely thorough information provided. I also think that teams having access to a mentor is a fantastic system, very invaluable.”

“It's a wonderful initiative.”

There is an effort to involve parents

“Parents involved to support the team as well.”

Generous support and guidance from the Techgirls team

“The slack channel for the mentors.”

“Organisers' support was great, plenty of resources provided and girls had a good structure to enable their creativity.”

“The communication was really good. It was very useful to receive weekly emails with lots of information and links to useful content in Blackboard.”

The weekly structure of the program helped to keep everyone on track

“The messaging and meetings during the pandemic were all very well planned.”

“Flexibility in times, new simplified structure.”

“The program was broken into weekly learning resources and aims.”

Coach Pre Survey

In the pre-survey, the 59 coaches were most represented in NSW (42%), Qld (35.5%), followed by VIC (12%), and less so in WA (12%), Tas (3%), SA (1%), and NZ (1.5%). 78% were based in a co-educational school, and 22% in a single-sex school. 61% had completed professional development in the past 5 years. 34% of coaches had participated previously in the program. 29% had participated previously in an Academy for Enterprising Girls workshop.

Gain by participating

Coaches were asked what they hoped to gain from participating in the competition.

Increasing the confidence and enthusiasm of their students

“The girls will be confident in their place as IT gurus!”

“Enthusing our girls in these fields.”

“Excite some of our girls about what is possible and what they can do in IT.”

“Generate enthusiasm around tech, give these students an opportunity to take their idea further.”

“Opportunity to foster an enthusiastic team of future leaders.”

“To help our scholars grow in confidence and explore different career avenues.”

“That the students gain an understanding of their strengths.”

“The satisfaction of seeing growth in the girls.”

Supporting students explore STEM and entrepreneurship

“Satisfaction in watching the girls shine in the areas of STEM.”

“Our girls love this competition and it has grown enormously this year. The fact that they know they have great ideas and want to share them is fantastic.”

“I hope to gain more knowledge in how to build and pitch an app or business prospect and to help my daughter make an app that may be published.”

“Connection with girls in my STEM class.”

“I wish my kid learns more about technology and tries to excel in the field.”

“To support my daughter's love for technology.”

“Give my daughter and her friends an insight into the varying programs to support STEM learning.”

“To have students develop a solution to a real-world problem.”

Provide opportunities to foster STEM skills

“That the 4 little champions I'm coaching feeling encouraged to work in STEM.”

“Gain a better insight in STEM projects and encourage these young women to be leaders in society.”

“Exposure to how to support the girls gain real world skills.”

“Allow girls to experience success in IT, improve connections between girls who like IT and provide opportunities for girls to have fun coding an app.”

“I hope to learn new skills, support the team members to build confidence/understanding of STEM areas and assist them to recognise skills they have to offer in this area so they might continue to study STEM subjects and potentially pursue careers in this area.”

“I hope that as coach and girls taking part learn about different tech activities available for girls to grow and learn.”

“Students can see the relevance of digital technology and how it can support the creation of development of ideas.”

“That the 4 little champions I'm coaching feeling encouraged to work in STEM.”

Build a STEM school culture

“This year I am hoping to encourage other teachers at the school to become more familiar with the program.”

“I hope to increase girls' engagement in STEM and encourage our girls to consider IT or STEM-based subjects as they move into VCE. I also hope to build a culture at the school where girls are supported to achieve their full potential and hope to be a role model for these girls.”

Primarily, to increase engagement and interest in STEM amongst the girls here. A long term schoolwide priority has been based around boosting engagement and attendance across the school. Personally, I embrace all opportunities to be involved with STEM competitions and share my passion for digital technology and STEM with others. I'm hoping to continue further developing my own skills in this area not only for my own teaching but to also pass on to my colleagues as I grow as a lead teacher in this area.”

“Improve the IT skills of students, lift the profile of the school, encourage more students to take up STEM”

“For teachers to integrate technology through a PBL style approach.”

Support STEM career choices

“Better understanding of what motivates young people to pick information technology-focused studies”

“Giving the students more engagement in technology and allowing them to use different skills that they will need when they go out into the workforce.”

“To challenge and inspire the students by developing solutions to real-world problems.”

“To encourage the girls to see possibilities that they may not have been aware of before. To show them the different areas that they could work in in the IT/Tech field. To teach them how to work as a team in a 'professional' environment. I'm sure I'll learn some things from the girls and from our mentor that will also help me in my career. For us all to learn new things and have a lot of fun along the way!”

“I hope to be able to guide the girls to develop a passion for their focus area and develop a creative solution using technology.”

Own personal development

“I hope to gain some great IT skills and to develop my own critical and creative thinking but also to give the girls an opportunity they wouldn't usually have.”

“An insight into app development.”

“To encourage the girls to see possibilities that they may not have been aware of before. To show them the different areas that they could work in in the IT/Tech field. To teach them how to work as a team in a 'professional' environment. I'm sure I'll learn some things from the girls and from our mentor that will also help me in my career. For us all to learn new things and have a lot of fun along the way!”

Coach Post Survey

In the post-survey, 63% of coaches reported that they would participate again in the Techgirls competition, 35% were a maybe, and only 1 person said no (2%). 85% of the coach's teams submitted final entries in 2021. 37% had participated in Techgirls previously. 72% had completed professional development in the past 5 years.

What worked well

Expectations were clearly communicated by Techgirls

“The set-out of the modules worked well and it was clear what the deliverables were. If we did have any questions we were able to email the Techgirls competition email address and received a response very quickly which was great”.

“Clear instructions, detailed week by week schedule, good resources”

“Regular updates on where the teams should be at”

Outstanding support from the Techgirls team

“TGAS organisation is very helpful at any stage. I really liked the online webinars”

“There was a lot of support from Amie and the tech girls movement”

“Blackboard as an online delivery system”

The curriculum content was engaging

“The variety of deliverables was good - business plan, coding, video pitch. It kept them engaged”

“Having past videos and examples from previous years motivated and helped the girls. The videos on Blackboard were helpful when needed too. Mentors were really helpful and kind”

“The girls seemed able to keep up and enjoyed the experience of seeing it all come together in the end”

Mentors are a valuable part of the program

“Mentors - great concept”

“Our mentor was fantastic. She was diligent, organised and guided the girls really well under challenging lockdown circumstances. The girls also worked terrifically together. They worked their way through the program well.”

“Weekly meetings, mentor visits both virtual and face to face, knowing more about the design thinking process”

“Mentor sessions in all aspects worked well”

“The mentor was of huge benefit to the team, providing so much support and information and helping the team to stay motivated and excited about their work.”

“Mentors - as I am not a specialist in the field this helped the students to gain advice and knowledge from someone that is”

“Our mentors this year were really good and we made much better use of MS Teams for resource sharing, communication and meetings”

Students collaborate to solve problems they care about

“Students working together to learn new skills and create apps that help address real-world problems they are passionate about”

“Coming up with ideas around problems and thinking of ways to support people to do better. teamwork, being mentored”

“Allowing the team the space to develop their own ideas was the most helpful approach”

“Students had the chance to shine with their individual skills. They experienced what it was like to work in a group for an extended period of time and manage themselves”

“Teamwork and confidence in collaboration”

“The girls worked really well together, coming up with an idea, planning it and then acting on their ideas”

A regular cadence with meetings and resources

“regular face to face meeting with all involved to brainstorm ideas and troubleshoot potential problems”

“The learning materials, weekly updates, weekly videos and so forth were really helpful in keeping me aware of what the team needed to be thinking about and doing”

Tech Girls ongoing communication via Blackboard and email was prompt and invaluable in ensuring I had the correct information for the team and resources I could forward to assist them in developing their ideas and work.

“Weekly videos/steps to give students a purpose for that week”

Support to students from our student ambassador

“the videos for coding - our coder loved Amelia's videos and learned heaps!”

What didn't work well

Time management

"It was difficult to find times that suited everyone due to individual commitments. We were able to work around this most of the time but there was definitely a decent commitment needed which may not have been understood from the start"

"Time frame to complete the activity, especially when the time allocation was over a 2-week holiday"

"We found it hard to find the time to work on it, with the competing priorities of school life!"

Scheduling mentor meetings

"Extremely difficult scheduling mentor visits and video calls - busy lives both ends. I ran 4 teams this year due to demand, and it was an extremely difficult juggling job"

Blocked internet access in schools

"Blackboard weekly meeting sign-ins stopped working, not sure why. We ended up doing Facetime. It is always challenging in a State School Setting as we are blocked from many applications including students signing themselves into app inventor. It also seems every year the girls who enter the challenge are also involved in many other school activities including sport, musicals, instrumental programs, student council meetings etc. Somehow they manage to fit it all in though :)"

Limited access to Blackboard for all team stakeholders

"It would have been so much better if the program platform was available for coaches, mentors and students to log in with their own usernames and passwords to be able to see everything on their own. It felt like all the responsibility was on the coach to feed the information through to the team but the instructions on the blackboard were always incredibly wordy. It would be great if the terminology was more student-friendly, it took my group an hour to complete the pre-competition survey. I understand we are not from an academic school, but perhaps the competition needs to specify that it wasn't going to be achievable for a group like us, the team ended up feeling too young (they are in Grade 5/6) and ill-equipped to complete the program in the given amount of time"

"The girls had trouble navigating the Blackboard course and it was quite a lot of work for me as coach to download the materials from the blackboard and upload them to our team site"

"Blackboard - I found it limiting that I could not share access to BB without me sharing the page 'live'

"The delivery of content on Blackboard - not easily accessible for the kids.

Lockdown! No in-person meetings

"COVID Lockdowns sure put a dampener on motivation and connections"

"Although lockdown has been very challenging to the team, and to each team member personally, I would have to acknowledge that the team has risen to the challenge. They have taken control of meetings, communications, shared documents, found ways to resolve glitchy videos and developed editing skills very quickly - even posting resources in preparation for the pitch videos. Lockdown has provided an opportunity to grow in many ways - in IT skills, creative problem solving, written and verbal communication and teamwork skills (although it hasn't always been an easy process)"

“We also had problems coordinating timetables so we had pretty mixed attendance rates. Also with shy team members, the video conferences really didn't work. In-person meetings were much better when we could do them”

Supporting multiple teams and their commitment levels

“There were challenges at times associated with supporting a team who had different levels of commitment (which also provided an opportunity for learning for me as a coach)”

“My own mistake. I assumed the competition paused over the school holidays. It wasn't until I got back to school that I realised we had lost a couple of weeks! I should have known better. Very little time in the 12 weeks to go into much depth with coding, particularly if we are wanting them to use external databases. I plan to run a course in Thinkable prior to next year's 12-week comp”

“Blackboard was hard to navigate with multiple teams as we had to be on there with each team for all meetings - but also be teaching a class”

Getting it all done

“There was a lot to cover in the 12-week program. The mentor and I felt the competition was not geared towards primary school, the girls in our team are only in Grade 4, so they did not understand a lot of what was required, revenues, budgets, marketing plans etc.”

“The short time frame meant that there was a lot of work to do in a short period of time and one team folded because of the pressure this created. A longer competition window would allow us to have one week to learn and one week to do and would allow us to manage better with our 30 minute meeting time slots at lunchtime each week”

“The overall process was great, but it felt like a bit much for 9 year-olds. Maybe some of it can be scaled back or at least the proviso being that younger students aren't expected to provide as much depth? There was a huge learning curve that felt constant for the girls”

Technical challenges

“Thinkable was difficult to use and did not allow collaboration - this made it difficult when a few students on the team wanted to code”

“We found the Blackboard platform difficult to navigate but appreciated the videos and resources”

“I found having to upload the mentor diary entries to Blackboard an unnecessary but time-consuming step. I would prefer if this was just submitted in the appendix of the business plan”

Too much in the curriculum

“I found that there were some elements of the business plan template that were a little unclear, such as the community map. It felt like some of the exercises, particularly during the Ideation phase do not need to be included”

“That we didn't have the program upfront - to plan for the future. As we are an independent school we needed to stay a step ahead... we couldn't do this as we didn't know what the steps were.

Participate again in the competition?

A great learning experience

"This has been a great learning experience for me and I have enjoyed working with the younger girls, sharing my knowledge and developing theirs"

"I find it frenetic and stressful but I really love the enthusiasm of the students"

"I think the competition has provided such a unique opportunity for the young women on the team to develop skills, confidence, and knowledge. It has also given them direct access to women working in a diverse range of STEM areas through presentations and their mentor. I don't think they would have had the chance to do something like this anywhere else or through any other program and it will positively impact them when they go on to choose subjects in their educational setting and in their thinking about further study and careers"

Seen student's confidence grow significantly as a result of the competition

"The girls LOVED it by the end. It was so wonderful to watch them grow and develop"

"It's a lot of work, but I have seen a real difference in the girls who have competed previously. They bring a real 'can-do' attitude to any big project in class, especially collaborative ones"

"The girls love it. They all leave the program with skills and confidence they have developed"

"Our teams learned such a lot. For the Year 7 students, they had no background in this at all and really shone"

Students really enjoy the real-world challenge

"The students have enjoyed the challenge and often want to improve the work they have done"

"Really enjoyed working with mentor and teams"

"It's inspiring supporting motivated girls to pursue their ideas and actually create a product while upskilling along the way"

"It is a great opportunity for younger students to meet other girls with the same passion as they do and work in a girls-only team in a competition that understands how to engage girls"

"Although it is long, the girls get so much out of it and learn more about tech skills as well as themselves"

"The program was an amazing opportunity for the girls to consider a real-life problem and to come up with a practical solution that gave them a result"

Like to know beforehand

"I can't think of anything that wasn't already provided"

"Nothing really, I felt it was well introduced"

How much work and time is involved

"How much work it is!"

"I probably didn't understand the full requirement but having said that it didn't put me off when I did, it just meant I needed to make sure we organised things well"

"In my first year, how much time it would take!"

“How much time is involved to be able to judge whether it's manageable. A clear view of Junior versus Senior expectations (I'm not a teacher so I can't judge this)”

“How much was involved. I initially thought it would be more based around brainstorming ideas, developing an app, and it being more about the kids' input, however, I as the coach had to lead everything. I thought there may have been an easy GUI that could have been used to create an app, with some light coding in the background. (I have web design and development experience) but this was not the case”

“Time commitments and competition requirements. It took a long time and organisation to do this on the run and then disseminate to my mentors and students”

“The date of the final showcase event”

“Which programs would be used for coding”

Advice for future coaches

Get up to speed on the competition requirements and team dynamics early

“Understand the requirements and the team dynamics and manage these closely”

“Just the amount of time involved. ie. how many hours a week is expected of the coaches. I would say it's at least 3 hours a week for 12 weeks. Also... getting the girls all set up using email and other ways of communicating is challenging”

“Regular check-ins with teams. Use an online communication tool. Be VERY clear about the amount of work that is involved before signing up students”

Closely monitor progress and milestones

“Stay on track with the milestone deliverables and allow some time at the end to review all submission requirements”

“Follow the schedule”

“Allocate your time through the weeks properly - don't try and leave much of it until the last moment!”

Start early and use the online resources

“It's a lot of work but if you do it steadily throughout the program is it very achievable and fulfilling”

“Check out the videos online. Start as early in the year as possible. Set up task boards and to-do lists to keep track of all team members. Remember that the girls have entered because they have a passion for something, and talents for many things, so keep in mind that each girl gives what they can”

“Start early, keep the business plan going throughout”

“Get to know Thunkable and Firebase really well and prep teams with some introductory app-building so at least they have a sense of the capabilities”

Be mindful of the time you have available

“It does take a lot of work for the students so you may need to consider what time you have available”

Spend time trying to develop your own skills

Believe in your own capabilities

“Don't be concerned about not having done the role before - there is so much support and information”

Trust in the student's capabilities

“Let the students drive the program - they shine!”

“Trust the girls to come up with their own ideas and solutions”

“Be ok with where the girls are at. They won't always have heaps of energy and be motivated to work productively”

“It's a great experience - allow the girls to drive the project, let it be their work”

“Have one student be in charge of communication with mentors”

Share the coach role if possible

“Don't coach more than one team on your own!”

“Find assistant coaches, especially if you are trying to coordinate lots of different competitions at the same time. This particular competition needs a more dedicated coach than some others especially with younger girls that need to feel supported and encouraged not to give up when they start to fall behind and be overwhelmed by all the amazing resources that are made available to them. They need help to be selective in what they engage with and don't get too bogged down in details early on”