THE GiST

Girls in STEM Toolkit

Evaluation Report

Version 1.1 August 2021

Education Services Australia

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Contents

1 Background

Funded by the Australian Government Department of Industry, Science, Energy and Resources, the Girls in STEM Toolkit (The GiST) project involved the development of an online STEM toolkit that provides girls with tools for understanding how their existing skills and interests can link to STEM careers and study pathways.

As well as providing information for students, the GiST includes resources for use by teachers, school leaders and families. These resources are provided to inspire and encourage girls to feel confident and enthusiastic about STEM and to take advantage of the increasing number of current and projected STEM-related jobs.

The toolkit is accessible as a digital platform and features a STEM career quiz to match girls' strengths and interests to possible study pathways and careers in STEM.

The toolkit is promoted through a range of communication channels and is accompanied by a professional development series of webinars.

ESA has undertaken an evaluation of the GiST using the Australian Government Women in STEM Ambassador's National Evaluation Guide to plan, design and undertake an evaluation of the existing GiST.

This document provides the findings from the evaluation of the existing GiST website.

2 Purpose

2.1 Problem

There are too few girls selecting STEM subjects at secondary school, participating in STEM activities and then pursuing STEM careers or pathways.

2.2 Audience

The intended audience for the GiST include secondary school girls, their teachers and families. We have focused on these groups for the evaluation of the existing GiST.

The audience for the evaluation report include:

- ESA project team
- DISER
- Girls in STEM education community

2.3 Goals

Outcomes – Short term

(Immediate – 1 year)

- Increase girls interest in STEM
- Increase girls belief that STEM careers are creative, collaborative and suited to them
- Increase girls intention to pursue STEM subjects, activities and careers
- Schools become aware of the problem and believe they can affect change to address the issue.

This evaluation is mainly evaluating these short – medium term goals as the GiST has not existed for long enough to evaluate the longer term goals outlined in the Evaluation plan.

2.4 Key Evaluation priorities

The GiST team identified three key evaluation priorities in the Evaluation plan, as outlined below.

Evaluate the effectiveness of the GiST for teachers:

- Do teachers find the resources on the GiST useful in supporting them to improve girls' participation in STEM?

Evaluate the usefulness of the Career quiz for students:

- Does the quiz guide students to discover STEM careers and does it provide useful information?

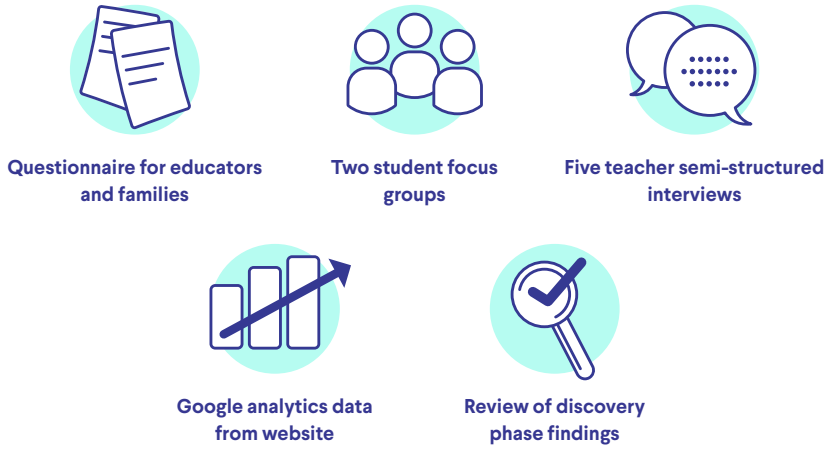
Evaluate the usefulness of the GiST for families:

- Are the resources on the GiST useful for families to support / encourage their girls into STEM pursuits/pathways?

These questions formed the focus for the evaluation activities detailed in the following sections of the report.

3 Method

The evaluation of the GiST was informed by multiple evaluation activities, including;



3.1 Questionnaire for educators and families

3.1.1 Promotion

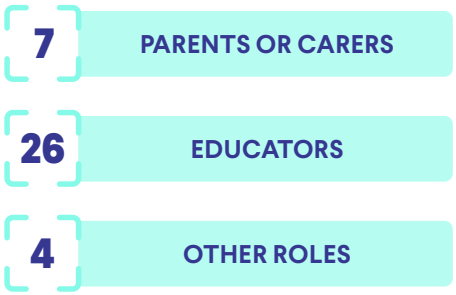
The questionnaire was promoted via multiple channels, including the ESA newsletter, the GiST newsletter and various social media channels. The initial response was very small, so it was re-promoted the following week offering two $100 gift voucher prizes as a raffle for participants. This increased the number of responses significantly, by the end of the response window there were 37 responses from the community.

Note: The prize offer also drew a large number of 'spam' responses from overseas bulk form filling that were deleted before data analysis was performed.

3.1.2 Respondents

In total, 37 surveys were completed from valid respondents.

Participants were asked to indicate whether their main role in using the GiST was as a professional educator, a parent/carer, or neither of these roles.



The questionnaire was structured to allow for different pathways through the questions for each audience, with some questions asked to all participants, and some questions that differed according to their indicated role.

Educators were asked for a more detailed breakdown of their role and indicated as follows (not some respondents indicated more than one role):

- 80% indicated they were classroom teachers, split evenly between primary and high schools (22 responses)
- 7% indicated they were university lecturers or tutors (2 responses)
- 7% indicated a principal or deputy principal role (2 responses)
- One respondent indicated a career advisory role
- Five respondents indicated other roles, including STEM organisation founder, Science communicator, School Support Learning Officer, Mentor, Makerspace leader.

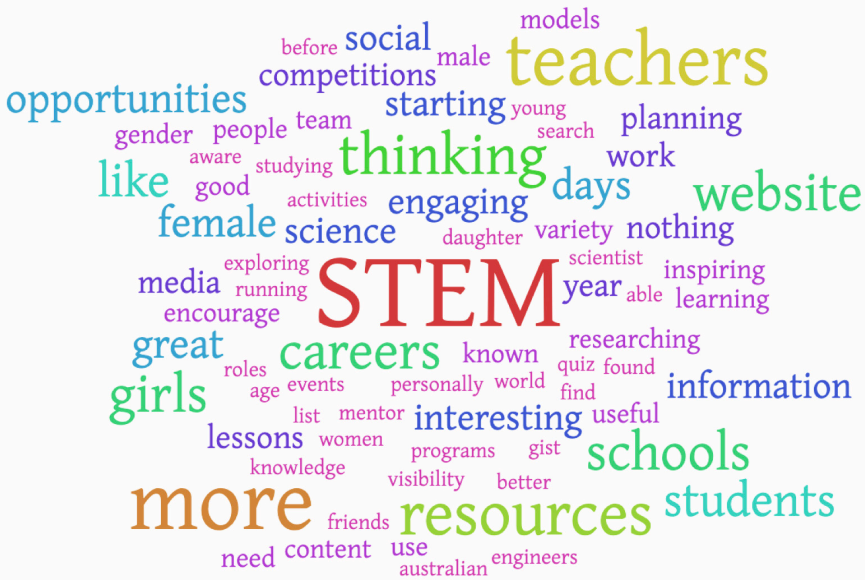
Parents and carers were asked for the schooling level of the students in their care. Two indicated early childhood students, three indicated primary students and two indicated high school students.

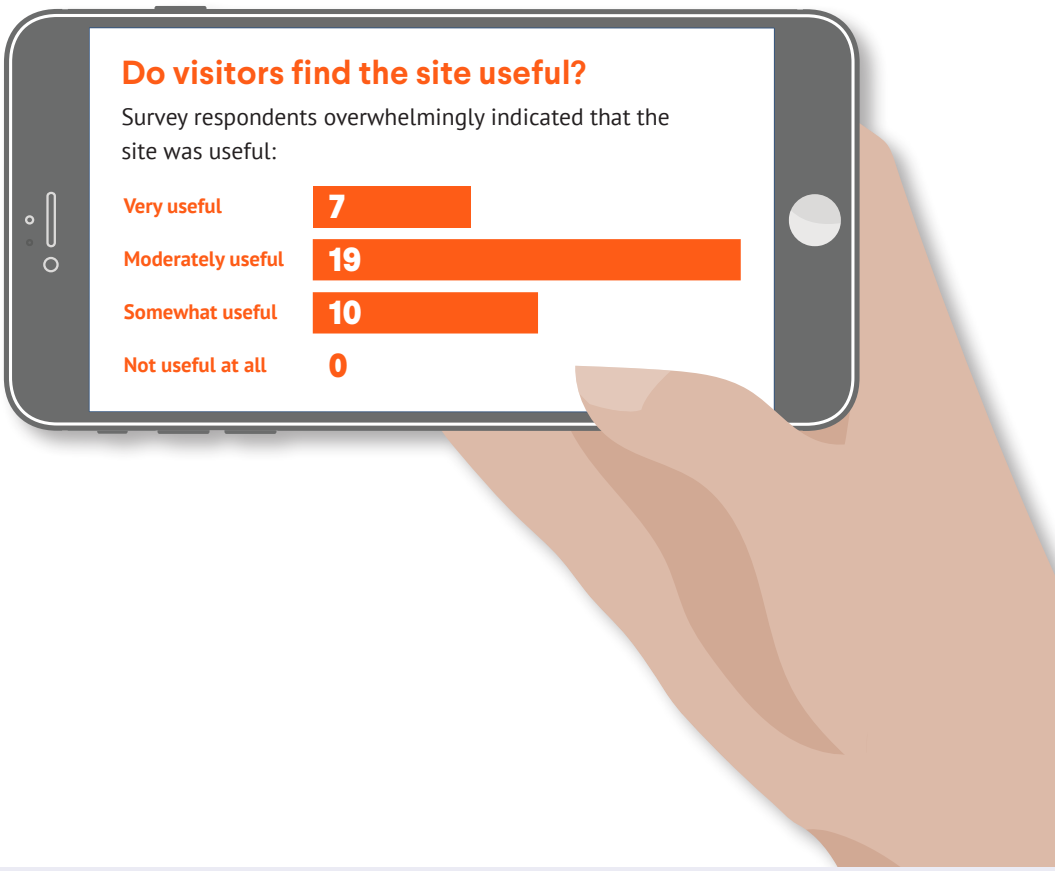
Parents were also asked about the importance of STEM subjects for girls in their care. All seven parent/carers indicated they perceived STEM as important, with six out of seven indicating it was 'Very important'.

Overall, although there was a relatively small pool of respondents, participants represented a wide range of schooling levels and roles.

3.1.3 Key findings from the survey

- Participants (all groups) like the site and find the resources valuable
- Many participants mentioned awareness/promotion/marketing as an issue
- Parents/carers come with different goals and needs when compared with educators, for example parents highlighted the value of careers information





3.1.4 Key quotes

> *In my current role I am a teacher librarian at 8 schools. I have been able to support my schools running STEM programs, as I have science qualifications and classroom teachers don't. Staff were not aware of the GiST website.*

> *I think it is a great website to use to encourage girls to be interested in STEM, my main frustration is male teachers are STEM teacher and there are not enough female STEM teachers. Encouraging more females to teach these roles, or for school leadership to understand the importance of employing female STEM teacher would be great.*

> *My daughter attends the online Engineers Australia High School program days, she has a team in tech girls competition this year and is researching gender bias with her team as the main community problem to solve.*

> *I was looking for work experience and extra-curricular activities for my daughter.*

A more detailed breakdown of the questions and responses from the survey follow in Appendix 1.

Strategies for success

- ☑ Explore ways to increase the awareness of the GiST
- ☑ Ensure the parent/carer audience needs are considered in planning for resources, in particular careers and learning pathway information for girls and their families

3.2 Student focus group

3.2.1 Structure

Youth Insight were engaged to hold two ninety minute focus groups, speaking with nine girls in each group. The first group was years 7-9 and the second group was years 10-12. The girls completed a 15 minute homework preparation task to visit the site, completing the quiz and a short survey and then participated in the focus group sessions.

3.2.2 Participants

The girls were selected from a range of states and territories, across the requested year groups.

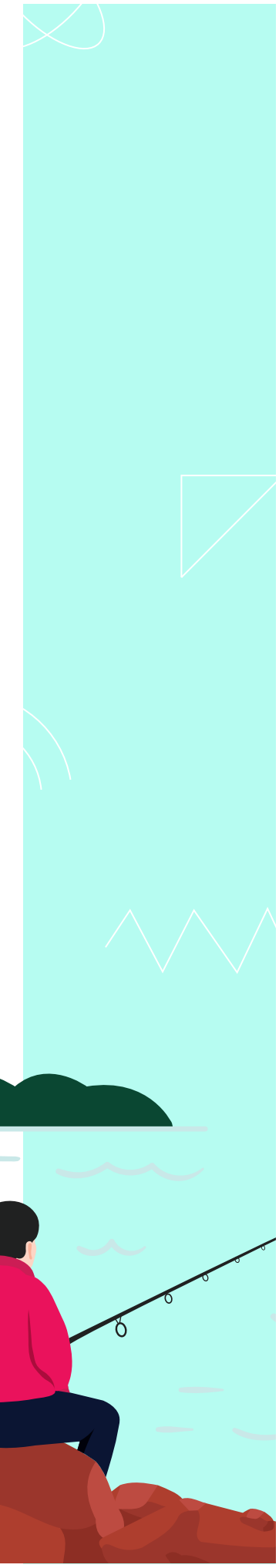
It was important that these groups be diverse. Participants' representation included the following audiences:

- 1 Identify as Aboriginal or Torres Strait Islander
- 3 Identified as BIPOC
- 5 From regional/rural areas
- 4 Identify as having a disability
- 4 Identify as CALD
- 5 Identify as being part of the LGBTQI+ community

3.2.3 Key findings

OVERALL WEBSITE: Once girls have explored the GiST, the purpose is well understood by most – to inform and inspire. And it does very well at doing both of these things. It is also seen as unique and not like other resources they might have used, the design is eye-catching and engaging, and the site is easy to use, especially the search bar.

QUIZ: The GiST quiz was particularly appealing. The visuals and imagery used are engaging, while the process of completing the quiz is simple. For many, the results are surprising (in a good way), with their expectation of a careers list being surpassed when they see a breakdown of relevant fields using percentages. The quiz gives students the flexibility to look further and find out more about study areas and careers that they are interested in. It provides students with an abundance of information about careers.



WOMEN IN STEM: The Women in STEM stories were inspiring and motivating, especially for the younger girls, who were keen to read even more stories. The older girls who were interested in STEM found the stories reaffirming and made them feel more confident in their decision to pursue STEM.

RELEVANCE: The GiST is relevant for young girls who have not made up their minds about their future pathway and career. It is also particularly relevant for older girls who have decided to pursue STEM, as it reaffirms that they have made a good decision. However, some girls who are not interested in STEM or who have selected another career pathway feel the GiST is less relevant to them.

IMPACT: The GiST inspires those in lower years to consider STEM and reassuring those who have chosen to pursue STEM. It gives them confidence and makes them re-evaluate negative perceptions of what it means to be a woman working in STEM.

3.2.4 Suggested improvements

Overall website

- Chunk information into sections with key headings so it is easy to scan information
- Increase use of design elements for key statistics, quotes and headings to make larger bodies of text more appealing. Make these insight nuggets stand out from the text with larger fonts, different colours, etc.
- Consider age-appropriate language and stay away from meta-language
- Increase use of videos across the site, particularly Women in STEM, but ensure videos are transcribed for those who want to read
- Tag careers and study areas by STEM school subject to allow for bottom-up navigation
- Provide more information
    - Detailed pathways, what school subjects are required for each study area and career
    - Course requirements, career requirements
    - Alternate pathways to STEM other than university
    - Scholarships/funding available
    - Overseas opportunities to study and work
    - Job prospects / information about the job market / where these jobs are
    - Traineeships - give you experience / a feel for that career while gaining skills
    - Work experience opportunities in STEM areas
- Explain the concept of STEM in more detail for younger students

Quiz

- Set expectations before the quiz so students know what to expect and know it is worth their time (not just a careers list).
- Improve accuracy of the quiz to ensure results reflect passions and interests:
  - Consider adding a 'neither' and 'both' options to quiz (although we appreciate this would impact the algorithm)
  - The quiz could go into more detail to narrow down the results to only the most relevant, e.g. a follow-up quiz with more specific questions.
- Make the "find out more" button more obvious and possibly give more information about what you are going to find out more about. E.g. "Click here to see study areas and careers".
- Consider that the current list of careers / study areas is overwhelming due to the large amount of information. The more information given, the more likely they will stick to reading about familiar careers and study areas. Improving quiz detail accuracy and creating a refined list of study areas may tackle this issue.
- There could be clearer information about each study area / career before it is clicked on – a brief summary to explain it before so they can decide whether it is worthwhile to read about.
- Ensure possible pathways are outlined for every subject area and career – exactly which subjects should be studied at which study level.
- Improve navigation of quiz results so it is easier to find specific careers you are already interested in. Possibly add a search bar within the quiz results or consider changing the user experience to prevent the amount of pages that they have to go back and forth through to find specific careers they are interested in.
- Point students to careers resources they can visit if the career they are looking for is missing, e.g. non-STEM.

Women in STEM

- Chunk text with subheadings, quotes and other visuals
- Add video case studies within the case studies page
- Tag case studies with STEM subjects to see what subjects it relates to
- Give clearer information about the pathway each person followed
- More Women in STEM stories
  - Wider range of ages 25-45
  - More culturally diverse women
  - More fields/careers
- Possibly add a search or filter functionality (e.g. by related STEM subject) so students can look for specific stories without having to scroll through all of them.

Promoting the GiST to students

- Target girls in Years 8-9 – they need this information to help them make the right decision about their subject selections in later years
- Utilise school partnerships to add the GiST to their careers resources, onboard careers counsellors
- Work with STEM teachers to promote the use of the STEM, e.g. in-class research tasks, "find out about women in STEM careers".

3.2.5 Key quotes

> *I think I want to study creative arts, but I'm not too sure. I don't want to study STEM because it's too hard and, well, I'm a bit lazy.*
> ***– Year 11 student***

> *I was interested in reading about the imposter syndrome and it surprised me about how many women feel insecure.*
> ***– Year 10 student***

> *It would be great if you had a career in mind, like an animal biologist, and you could just type in the word 'animal' and you would get lots of information.*
> ***– Year 9 student***

> *It showed me there are many things you could do, and you can do anything you want if you put your mind to it.*
> ***– Year 7 student***

> *Women of colour are already a minority, so in STEM careers they are even more of a minority. So it's fair enough that it might be hard to find people to tell their story. But I think it would be good if there were more people like me.*
> ***– Year 11 student***

More details from the student focus group conversations and surveys can be read in the full report.

Strategies for success

- ☑ Ensure information is easy to read and well tagged to allow for subject searching (consider plain English and chunking of information on pages)
- ☑ Provide more diverse examples of women in STEM and make explicit their learning and career pathways
- ☑ Include more video content where possible so that girls can visualise the working life of women in STEM and project themselves into these roles
- ☑ Provide more support for STEM teachers to introduce STEM careers as part of their teaching programs

3.3 Teacher semi-structured interview

3.3.1 Promotion

The GiST newsletter group was segmented to send a targeted email to teachers on the mailing list calling for those who use the GiST to share their stories for the evaluation, via a short interview.

3.3.2 Respondents

Five teachers gave semi-structured interviews. They were given the option to answer questions by returning interview questions via email, or to hold an online video conversation. Two chose to answer via email, and three video interviews were held.

The video interviews were recorded for note-taking purposes.

The teachers were from a range of schooling contexts, briefly described below. More information can be found in Appendix 2 – Case study vignettes.

1. Science teacher – Urban secondary ACT
2. Regional secondary NSW
3. Urban secondary Vic
4. Urban primary NSW
5. Urban secondary NSW

3.3.3 Key findings

Participants in the interviews outlined a number of challenges and opportunities in their teaching practise that aligned with the goals and key evaluation priorities of the GiST. Outlined below are the major themes that emerged across the interviews as a group. Specific quotes and further details are in Appendix 2.

Challenges for building gender inclusive STEM programs:

Perceptions of STEM subjects and careers:

- Girls often lack confidence in engaging in STEM activities and subjects
- Consciously or unconsciously, adults (family, teachers or others) can project the idea that STEM subjects are for boys
- Role models in schools (eg STEM teachers) are often male, this is especially difficult in reginal schools where staffing is challenging
- There is sometimes pushback against programs that are targeted specifically at girls

Teaching and learning environments/systems:

- Integrating STEM concepts into teaching and learning programs in primary schools can be difficult based on structures and teacher experience and confidence
- Embedding STEM learning pathways and futures/careers into teaching and learning programs is largely unsupported
- Setting up events for girls in STEM can be difficult. Outreach programs, working with higher education institutions and corporate partnerships can all be difficult for a teacher to approach to create authentic/hands on events involving real technology and audiences
- The current situation with COVID 19 and learning online has made connecting with students who were difficult to reach even more difficult

Opportunities for building gender inclusive STEM programs:

- The GiST provides evidence-based principles and example practises that give teachers authority to run STEM programs with gender-inclusive goals (some defence against the pushback encountered)
- Providing gender-inclusive STEM teaching and learning can (and does) make a difference for all students
- Applying gender-inclusive principles doesn't mean redesigning a teaching program from scratch – it can be implementing some small changes to existing programs
- The GiST helps highlight the importance of critical and creative thinking, higher order thinking and inquiry based learning that are important components of STEM subjects (STEAM)
- Embedding learning pathways and careers into STEM classrooms can help girls (and all students) see the value in what they are learning and the breadth of learning and skills involved in STEM subjects

Strategies for success

- ☑ Explore creating some case studies around the Seven principles that model some simple ways teachers have implemented the principles in their schools and classrooms
- ☑ Provide resources to for teachers to integrate careers information into their STEM programs that support girls
- ☑ Provide some practical strategies for setting up STEM events or extra-curricular activities, either targeted at girls or with a gender-inclusive lens

3.4 Analytics data from website

The following analytics data is from the visitors to the GiST during the eighteen month period from Jan 1 2020 to Jun 30 2021. This has allowed some of the changes over the time period to be observed as well as gathering a large enough cohort of users to provide confidence in the data.

3.4.1 Acquisition

Most of the users over the time period were direct visitors, indicating that they came directly to the site via a website bookmark, browser history or URL entry. This indicates that either many users find the site useful enough to have a bookmark kept in one case, or that the site's URL is memorable and easy to type in for visitors.

Channel	Users	Users (%)	Pages per session	Average duration (seconds)
Direct	8768	31%	2.67	162.16
Organic Search	6958	25%	2.51	184.12
Referral	6199	22%	2.63	196.22
Social	2667	9%	1.71	71.58
Email	2657	9%	1.60	67.56
(Other)	885	3%	2.05	66.30

Users who enter directly also tend to view the most pages on during their visit. Although visitors arriving from referrals or search spend longer on the site.

3.4.2 Behaviour

Visitors to the site view a wide range of pages, below are the top ten viewed over the Jan 2020 – Jun 2021 time period. Indicated in parentheses is the intended audience of the page. There is no way to know from this data the **actual** audience, but this forms a loose indication of the possible audience.

Page title (Audience)	Page views	Unique page views	Average time on page (seconds)
Homepage	13861	11526	89.88
The GiST Quiz (Students)	4385	3535	154.51
Classroom strategies (Schools)	2797	2435	114.05
Bee Habitat (Schools)	2665	2452	840.24
Seven principles for a gender-inclusive learning environment (Schools)	2548	2281	299.79
At home activities (Families)	2263	1962	341.66
Careers A-Z (Students)	2122	1220	72.84
STEM educator resources (Schools)	2119	1674	42.83
Poster series (Schools)	1643	1476	265.5
Green packaging (Schools)	1519	1387	766.85

Points to note:

- The GiST quiz is the highest individual page over the time period (other than the home page) highlighting its popularity. Usage patterns observed indicate that this is used both by individual students independently, as well as in large groups (assuming face to face or online classroom environment, as directed by a teacher). What is not obvious from the above table, is that the underlying pages from the quiz that students enter after completing the quiz have a very high engagement count as well, but as this data is fragmented across multiple pages it isn't included in the 'top ten' here. However the exit rate from this page is extremely low at only 16%.
- Pages for schools feature highly in the results, so it's likely that educators are finding the resources and engaging with them.
- The 'At home activities' page was particularly popular during the whole of 2020, perhaps indicating the challenge for many families and schools to find educational resources in a completely 'at home' environment that emerged periodically during the last eighteen months, particularly in Victoria. Indeed, further segmentation of the data reveals Victorian visitors as the main users of the 'At home activities' page during this time period.

3.4.3 Search

A low proportion of visitors to the GiST used the site search over the eighteen month period under investigation.

Site Search Status	Sessions	Bounce Rate	Pages / Session	Avg. Session Duration
Visits **Without** Site Search	37286	58.52%	2.31	149.36
Visits **With** Site Search	489	1.43%	11.15	699.64
	37775	57.78%	2.43	156.48

A low percentage of searching points to users mostly finding what they need on the GiST without needing to resort to a text search. This could mean that the site organisation is clear, logical and easy to use.

With the small number of searches performed on the site over the time period examined, the following should only be used as a secondary dimension to guide discussion, as there is not sufficient data to draw solid patterns of use from.

Of the visitors that did search, there was a much longer session duration and a larger number of pages per session. This could indicate that the users spent some time refining their search. It could also mean that visitors that arrive with a specific goal or need (that they subsequently searched for) are more likely to spend time engaging with the content in depth.

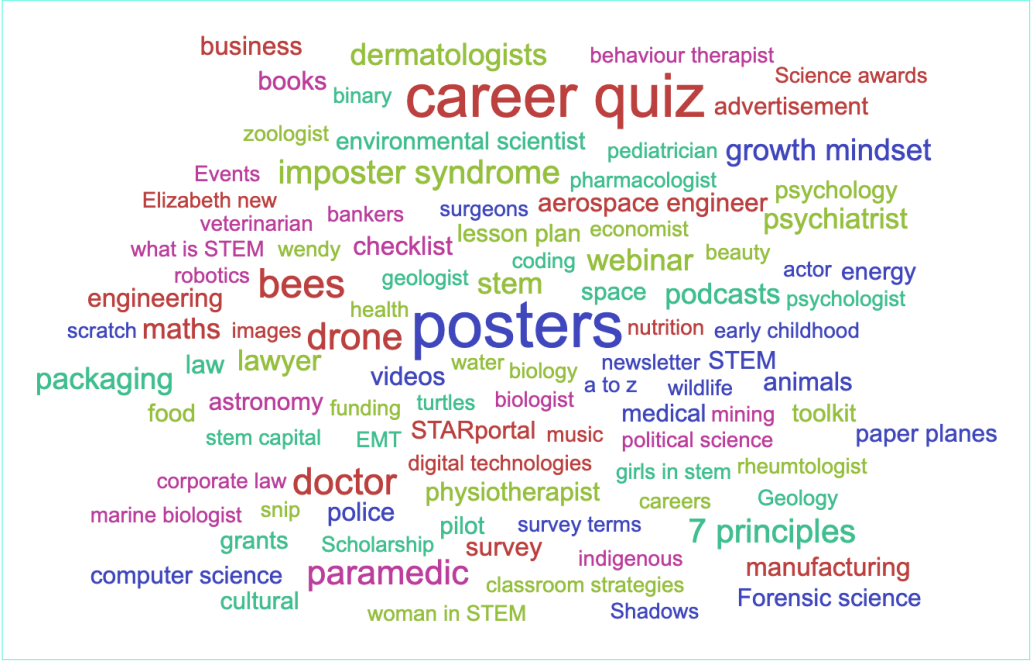
The top search terms are also valuable in determining the goals of users visiting the site. In particular, search terms can reveal resources that users are searching for that we may not be currently providing, or may not be easy to find by navigating.

The top ten are shown below.

Search Term	Total Unique Searches	% Search Exits	% Search Refinements	Time after Search
posters	14	14.29%	7.14%	146.64
quiz	11	9.09%	7.69%	262.09
poster	7	0.00%	0.00%	218.29
drone	6	66.67%	16.67%	135.33
imposter syndrome	6	0.00%	0.00%	10.5
paramedic	6	0.00%	42.86%	522.17
stem	6	33.33%	14.29%	156.5
webinar	6	0.00%	16.67%	124.83
bee	4	25.00%	0.00%	2655.25
books	4	0.00%	16.67%	1179.25

There are relatively few exits after searching, and relatively few search refinements, so users seem to be finding what they want in most cases. There is also a significant engagement time after some searches, in particular the 'bee' search which leads to the Bee Habitat lesson resources.

The top 100 search terms are shown below as a cloud, with word forms and similar concepts grouped for counting purposes (eg plurals grouped with singular, mistypings with correct spellings, and 'quiz', 'careers quiz' and 'GiST quiz'). This gives a general feel for the kinds of resources and information that users were searching for.



3.4.4 Key findings

These analytics provide evidence that the GiST provides useful resources for all of the key audiences. There is a significant level of time spent on the site by visitors, indicating that they are engaging with the site content. Finally, there is a relatively low number of searches over the duration examined, suggesting that users easily find what they need without resorting to search, so the design of the site is helping the GiST users meet their goals.

Strategies for success

- ☑ Ensure site structure remains easy for users to navigate
- ☑ Keep the site updated with relevant and engaging content
- ☑ Ensure the site search returns relevant results

3.5 Review of discovery phase findings

3.5.1 Key Insights from discovery workshop – Jan 2019

Teachers

1. Teachers are after guidance and resources that are specific, practical and easy to apply to their classroom. Do not want extra work or extracurricular activities or 'themes' of general information.
2. Teachers want to see stories and case studies from other teachers to do with STEM uptake from female students.

Students

1. Young students want 'fun' and humorous content to get them interested.
2. Primary students prefer to read over watching video content.
3. Many female students use Pinterest as a key social media channel
4. Female students find career choice overwhelming, research frustrating and feel rushed to decide
5. Female students think maths is boring and assume maths careers do not have any excitement, collaboration or teamwork.
6. Female students see networks and connections with professionals as very important and desirable "I need connections to get a job"
    a. They want to be able to connect and talk with real/achievable professionals – not just the superheros
7. Female students see STEM as too broad and struggle to relate jobs and careers to the subjects they do at school.
8. Having a purpose and social mission in their career is very important to female students
9. Female students want to see clear career options based on their passions and skills - this validates the proposed interactive tool

Parents

1. Parents view teachers and the school as the most effective influencer on their children to inspire them about STEM
2. Parents will click on any link the school sends them in emails as they trust their information

General

1. Using stories is the most effective way of communicating and making STEM career pathways tangible
2. Google is the main research tool for all audiences.

3.5.2 Connections with current evaluation

Many of these findings strongly align with the findings from the recently conducted evaluation activities. In particular:

Teachers have indicated in the survey and interviews that they are interested in practical lesson plans, examples of inclusive STEM teaching practice and more subject/career pathway resources for students.

The student feedback from the discovery phase workshop ties in strongly with the focus group insights, including that the students

- prefer reading to watching or informational content (even though these students were high school students),
- find careers advice confusing and overwhelming,
- perceive that STEM careers might be boring and 'hard work',
- didn't realise how specific/targeted STEM careers could be compared to the broad way STEM subjects are presented, and
- wanted to see pathways and skills required for careers so that they could make informed choices in school.

The parent feedback from the survey certainly affirms the discovery phase findings: parents want careers pathways to be clear so that their children can make good choices about subjects and do well in school.

4 Conclusion

Referring back to the key evaluation priorities as the purpose for gathering and synthesising this information.

Key evaluation questions:

- Do teachers find the resources on the GiST useful in supporting them to improve girls' participation in STEM?
- Does the quiz guide students to discover STEM careers and does it provide useful information?
- Are the resources on the GiST useful for families to support / encourage their girls into STEM pursuits/pathways?

Overall, the evaluation activities indicated that overwhelmingly that users of the GiST find the site useful, informative and inspiring.

4.1 Teachers

The evaluation reveals that teachers find the resources on the GiST useful in supporting their efforts to improve girl's participation in STEM. The questionnaire results, the site analytics data and interview participants affirm that the GiST resources, particularly the Seven principles for a gender-inclusive learning environment, give practical and powerful strategies to implement change in their schools and classrooms.

One teacher said during her interview:

> *I mean I'm in the yard doing yard duty and girls will be coming up. "Oh Miss! We've just been talking together and we've just been saying to each other that everybody really needs to make sure that they do a science. It's a really important subject," and this has been my vision.*

> *And it's just because of these simple GiST principles. Can you see why I'm passionate about it?*

> *I'm also passionate because it's also based on research. That's what I really love. It's not, you know, as teachers often teachers will do things because of gut feeling, or I did this once and it didn't work...*

4.2 Students

The evaluation gave many new and useful insights into the usefulness of The GiST for girls, as well as how they access learning pathways and careers information more broadly. The overwhelming message was that the site is useful. In particular the girls valued the careers quiz and stories from real women in STEM careers. Girls asked for more clear and explicit information about how to achieve their goals via more learning pathway information in women's stories and for more diversity in the role models in STEM studying and workplaces.

Girls also stated that careers information should be available to them early in their high school years so that they could access what they need to allow them to make informed subject choices.

> *I liked reading about their stories and their career pathways, how they became what they are now. I think there should be more stories about those women.*
> ***– Year 7 student***

4.3 Families

The evaluation activities highlighted the importance of accessible study and careers information for parents and carers of girls. The small group of parents who participated in the survey all agreed that STEM subjects are important and that The GiST site is useful. Their goals differed from that of the educator audience; parents and carers first priorities in visiting the site is to find resources to help the girls in their care decide on careers and be inspired by women in STEM roles.

Some statements from parents and carers that highlight this:

> *The site could be improved by listing all the syllabus outcomes and indicators that each activity is achieving.*

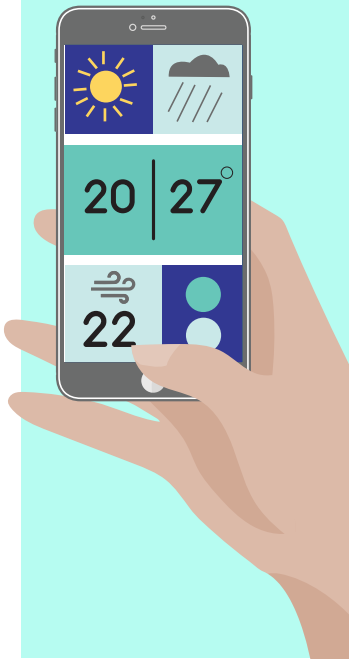
> *My daughter has a male scientist as a tutor, would be great to have a female mentor.*

5 Appendix 1: Questionnaire summary

5.1 Results

5.1.1 Visiting

Six respondents indicated that they had not used the GiST prior to filling out the questionnaire, but all but one indicated that they found the site useful now that they had discovered it.



How did our visitors find us?

Respondents were asked how they came to hear of the GiST:

Search engine	11
Social media	11
Email communication	6
Recommended by friend or colleague	5
Conference	4
Blog or article	2
Other (please specify) Other included Professional associations	1

This is useful given that other feedback from the group indicated a need for more awareness-raising activities.

When asked what social media tools and sites they generally used, participants indicated:

Facebook	27
Instagram	16
Youtube	15
Twitter	10
LinkedIn	10
Pinterest	4
Other (please specify) included: clubhouse	1

This data aligns with findings from the site analytics that show Facebook as the largest number of referrals via social media.

How often do they visit?

Participants were asked to estimate how often they had visited the site:

Weekly	0
Fortnightly	1
Monthly	7
Once every three months	11
Once every six months	13
I have not used The GiST website	5

Repeat visiting depends on a number of factors including the nature of the content and the purpose and context of the audience.

Note that six of the participants indicated that this was their first visit. Of these only one indicated the site was not useful; possibly the survey and the associated competition formed a useful awareness-raising activity themselves.

What is their motivation for visiting? (what are their goals?)

This question was split for the parent and educator audiences:

Educators:

Educators were asked whether they came to the site with the following issues that they were hoping to solve (they could select more than one):

One or more girls in my school seeking learning pathway advice for STEM subjects or career	13
Attitude towards STEM from girls in my school	12
Gender imbalance in STEM classes in my school	9
Attitude towards girls in STEM classes from staff in my school	5
Other (please specify) Other included: teaching material for preservice teachers, STEM in practise beyond school, attrition levels in girls interest in STEM from year 7 onwards	4

They were also asked for the kinds of resources they were hoping to find on the GiST. The following were the most frequently selected from the 21 educators (they could select more than one):

To search for articles/research about girls in STEM	19
To find classroom resources such as lesson plans	18
To find role models to inspire students	15
To find whole-school resources	13

Interestingly given that so many indicated that there were girls in the school seeking learning pathway advice, one of the least frequently sought out resource types was 'careers information' with only five respondents indicating that they hoped to find such information on the GiST.

Parents and carers:

Parents were presented with the following issues and asked whether they came to the GiST hoping to solve them, this resulted in a fairly even spread of responses from the seven parents:

Girls' perceptions about STEM subjects and careers	4
Gender imbalance in STEM classes at school	4
Attitude towards STEM from girls at school	2
Attitude towards girls in STEM classes from staff	2
A girl in my care is seeking learning pathway advice for STEM subjects or career	3

Parents/carers also indicated the kinds of resources they would hope to find on the GiST, the most frequent responses included:

Careers advice	5
Ways to connect with experts and role models	5
Science activities	4
Robotics activities	4
STEM Subject advice and learning pathways	3
Current or ongoing STEM-related competitions for students	3
Current STEM-related student events to attend (online or in person)	3
Girls/women in STEM in the news	3

The least frequently chose options were that only one parent indicated that they would come looking for rainy day activities. Likewise only one respondent indicated an interest in activities that centred around data collection and/or analysis.

Contrasting the two groups (educators and parents/carers) is difficult with such small numbers – but it is useful to note that careers advice was quite frequently sought by parents (unsurprisingly) but relatively infrequently sought by educators.

5.1.2 Usefulness

Do visitors find the site useful?

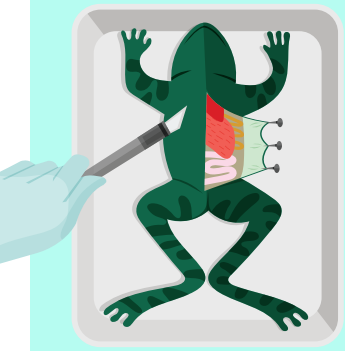
Survey respondents overwhelmingly indicated that the site was useful:

Very useful	7
Moderately useful	19
Somewhat useful	10
Not useful at all	0

Which sections of the site do visitors use the most?

Respondents reported using a broad range of the site, with both audiences reporting similar sections as being used the most. It is useful to note that the parent/carers found the educator resources as being useful, need to take care that we don't omit cross-audience groupings like this in planning.

STEM educator resources	18
Supporting Girls in STEM	17
Create an inspiring STEM environment	17
Women in STEM	17
Explore STEM careers	13
Changing the world with STEM	10
Quiz and careers	9
Why STEM matters	8
Getting her interested in STEM	8
Career advisors	6
Engage the STEM community	6
Get involved	2



Did they find the resources they sought?

The majority of the respondents indicated that the found what they were looking for on the GiST site. Of those that did not find them on the GiST, most indicated that they could not find what they needed anywhere.

Yes, I found what I needed on the GiST website	30
Yes, but I found what I needed on another site (which web site?)	1
No, I searched the GiST and elsewhere and did not find what I needed	5

It would be interesting to know what users were looking for that they did not find on other sites. This information could be followed up in future evaluations.

Would they recommend the site to others?

Two thirds of the participants of the survey indicated they were at least 'Very likely' to recommend the site to a friend or colleague.

Definitely	9
Very likely	16
Somewhat likely	6
Possibly	4
Unlikely	1

Note that:

- The 'Unlikely' response came from a participant who was looking for work experience resources, so perhaps this was because we did not meet their immediate needs.

5.1.3 Improvements

Participants were asked for general feedback for how the site could be improved. The following categories summarise some of the repeated concepts raised:

- Wider range of age groups (from early primary to university level)
- More awareness-raising activities required (marketing, social media, promotion)
- More events, especially around current events and themed days – for both girls and schools/teachers

Some example statements about improvements:

> *I think it should be improved from the student aspect as I feel like there could be a lot more information on here for girls who are especially about to leave high school, I would like to see more information about uni courses and more stories from those currently studying stem degrees.*

> *By incorporating activities that start at a younger age category than just stage 3. As a year 4 teacher I have noticed that the gender imbalance has already started. We need to better prepare teachers to adapt their mode of thinking and teaching in primary school. By starting this in the early years we will be using a proactive model rather than a reactive model. We need to intervene and stop the train of thought before it has begun.*

> *I love the colour choices and symbols on the website but when talking to other people I know not many people have heard about your resource. I feel like more marketing and social media engagement is needed to make people aware of this resource. I personally would have liked to have known about it before.*

Professional Learning opportunities. Zoom workshops for students. Competitions for girls.

6 Appendix 2: Case study vignettes

Summaries of each of the teacher interviews. Full transcripts available on request.

6.1 Teacher 1

6.1.1 Background

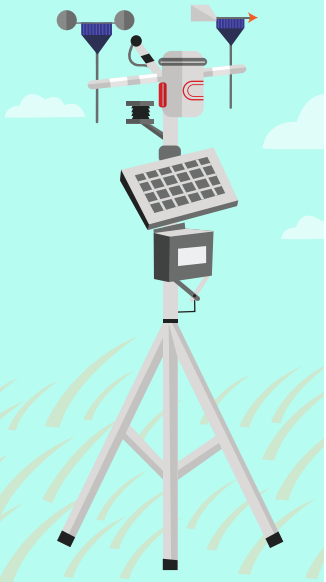
Qualified experienced science teacher. A range of teaching experiences, currently teaching year 11 and 12 sciences and technology.

6.1.2 School setting

Urban secondary government school, ACT, culturally diverse, a range of socio-economic backgrounds.

6.1.3 Key messages

- Girls need more confidence in STEM learning, STEM anxiety is an issue for many girls
- Programs targeting girls can encounter pushback, dealing with this diplomatically can be difficult
- Finding a good gender balance for staffing STEM areas is important - but challenging, especially in technology, engineering, mathematics and physical sciences.



My goals have become very clear as my career has evolved: I want to provide my students with the knowledge and skills they need to make good decisions or themselves and the communities in which they live, my passion is equity for all in terms of access to high quality educational opportunities.

6.2 Teacher 2

6.2.1 Background

Qualified science teacher. Originally trained in vegetation and wildlife management, worked in forest protection and then a master's degree in specialising in remote sensing. Trained as a teacher and has been teaching for ten years. Currently teaching science in years 7-10, has been at current school for ten years.

6.2.2 School setting

Regional secondary government school NSW, low socio-economic area, stable population.

6.2.3 Key messages

- Staffing in regional schools is challenging, teachers are often teaching out of area and across a broad range of subjects/disciplines. This make gender-inclusive STEM teaching/role models difficult to provide.
- Girls are under-represented in the extra-curricular STEM activities and groups offered by the school (eg robotics club). Travel and transport is challenging with a regional school, so this compounds the problems.

> *I have not made much use of the (GiST) resources. I have read the principles of a gender neutral classroom and attempt to put these in place. I am currently trying to get permission from the school leadership to print and laminate the poster series of women role models.*

6.3 Teacher 3

6.3.1 Background

Qualified science teacher. Originally trained and worked in chemical engineering, moved into teaching later. Currently teaching years 7-12 and leading science teacher at the school.

6.3.2 School setting

Urban secondary Vic, low fee independent school.

6.3.3 Key messages

- The GiST provides evidence-based examples and principles. This is powerful for teachers as it gives authority/justification for applying gender-including STEM programs or programs that are specifically targeting girls, where these programs often encounter pushback.
- Providing gender-inclusive programs can make a difference for all students learning (not just in STEM, and not just girls benefit from the approaches)
- Applying the seven principles doesn't have to mean redesigning the whole curriculum. It might just mean using the lens of the principles to tweak an existing program.

> *It is powerful and it has the potential to, I don't think I'm overstating it, revolutionize what people do in their classroom and in school.*

> *And now our class numbers, as you've read, have gone from 8 in VCE to 19. You know that just astounded me that these changes that I had made specifically to engage girls actually ended up engaging another whole group of boys that we were disengaging, by the way that we were teaching science ... there was a whole gamut of young men and boys who because of the way we've traditionally taught science, believe that it's not for them.*

6.4 Teacher 4

6.4.1 Background

Qualified primary teacher. Trained and worked in marketing and advertising, later retrained as a teacher. Currently running a STEM makerspace in the school with all of the students spending 30 minutes in the space each week, accompanied by their classroom teacher.

6.4.2 School setting

Urban primary government school, NSW, low socio-economic area, many students with culturally diverse backgrounds.

6.4.3 Key messages

- Meaningfully embedding STEM subjects into primary teaching can be challenging. There are multiple models, but short, non-integrated sessions will be less successful than those that are integrated
- There is value in trying other models of teaching to address perceptions of girls in STEM, including programs targeted at girls
- Extra-curricular activities can be powerful at engaging girls in STEM but that there are multiple challenges for teachers in setting these up, and often rely on teacher's own time to plan and run them.

> *It's so whenever I see any learning, I try and make an event of it so that that event might be a whole school showcase or a girls and stem afternoon or a weekend activity.*

6.5 Teacher 5

6.5.1 Background

Qualified visual arts teacher, has been teaching for about 15 years. Moved into working with special needs and gifted and talented students and then into higher order thinking focus. Now leading the STEM stream for students.

6.5.2 School setting

Urban secondary government school in Sydney. Focus on academic excellence and student individuality, music, drama and visual arts.

6.5.3 Key messages

- The importance of critical and creative thinking and higher order thinking skills as a key element of STEM teaching and learning
- Perceptions still exist among staff, students and families that STEM is for boys
- The value of embedding careers/futures into learning, particularly for STEM so that girls can see the connection between their learning and the breadth of STEM careers.

> *I think it's just the age old belief that girls are good at, you know one thing, but boys are good at maths and science and I think that's just where it comes down to, but they do all have ideas about their careers and I often have discussions with them about it.*

> *I wrote a unit of work and it was doing public art and then I linked all the careers that were related. So yeah, sure, there's the artist who comes up with the idea. But then there's the engineer who probably puts it into place. There's the project manager. There's the landscape architect. And realistically, a lot of those jobs actually have STEM backgrounds as well. Even though you like it's I was coming at it from the public art point of view, and the visual art point of view.*

> *A career counsellor...? In year ten they have to attend a career subject. Three hours etc. But I don't really know what goes on in that subject.*

> *The one thing that I will say about girls in STEM and girls in general in industry and something that I still find challenging, is career pathways for women and then becoming a mum is really hard. I think that's something that even the website could look at. I just look at New Zealand, Jacinda Adern, and how amazing she is and she's accomplished being a Prime Minister and becoming a mom at the same time. Not being limited by your career pathway because you want to have a family...well, because I found it really challenging.*