

World Science Festival Brisbane

Impact Assessment *STEM Engagement and Learning*

Queensland Museum Foundation Trust

August 2019



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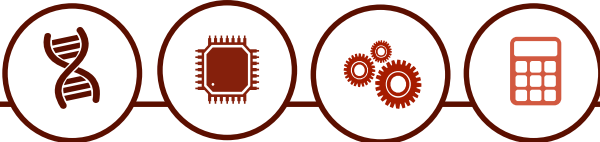


Background

Hailed by The New York Times as ‘a new cultural institution’, the World Science Festival has been held annually in New York for over a decade. Queensland Museum Network (QMN) holds the exclusive license to host the World Science Festival in the Asia Pacific 2016-21: the only global extension of this hugely popular initiative.

World Science Festival Brisbane (WSFB) explores the entanglement of science and art through a curated program of conversation, theatre and cinematic performance, education events and outdoor experiences. By integrating art and design with science and technology, WSFB provides multiple, non-traditional platforms for generations to engage with science, technology, engineering and mathematics (STEM) concepts.

Over the past four years, WSFB has attracted 700,000 attendances, and injected \$32 million into the Queensland economy¹. While impressive, these results do not consider the impact of WSFB on the Queensland community, particularly with respect to STEM engagement and learning. There is little research into the qualitative impacts of large-scale events and festivals. QMN strives to reinforce its position as a leader in STEM engagement by developing a longitudinal social impact evaluation model that complements traditional economic analysis. The results of the evaluation will validate decades of anecdotal thinking and inform WSFB legacy.



Why STEM?

The topic of STEM engagement and learning has been the subject of a number of recent studies and reports produced by both public and private bodies, detailing the challenges, opportunities and concerning trends that currently confront STEM engagement and learning in Australia.

As a nation we are facing economic challenges that are both circumstantial and structural – slower GDP growth, declining real incomes, low productivity growth, and sluggish global growth.

Previous PwC research tells us that although many current Australian jobs are at high risk of being affected by digital disruption, only a small percentage of university graduates in Australia are from STEM-

related courses. For example, a 2015 report produced by PwC² revealed that Australia is currently lagging behind other OECD nations when measured against a number of STEM related indicators. Similarly, in a 2016 report by the Office of Australia’s Chief Scientist, science, research and innovation are widely recognised as key to creating more and better jobs, enhancing competitiveness and growing an economy³.

The purpose of measuring STEM engagement and learning as a result of the WSFB is to gauge its contribution toward a future where Australia’s growth is driven by a culture of innovation; a future where STEM skills and capability are the foundations for a vibrant and prosperous economy.

1. Queensland Museum Network 2019, Economic Impact provided by Tourism and Events Queensland
2. PwC, A smart move: Future proofing Australia’s workforce by growing skills in science, technology, engineering and maths (STEM), April 2015.
3. Office of the Chief Scientist 2016, Australia’s STEM Workforce: Science, Technology, Engineering and Mathematics, Australian Government, Canberra.

Evaluation Framework



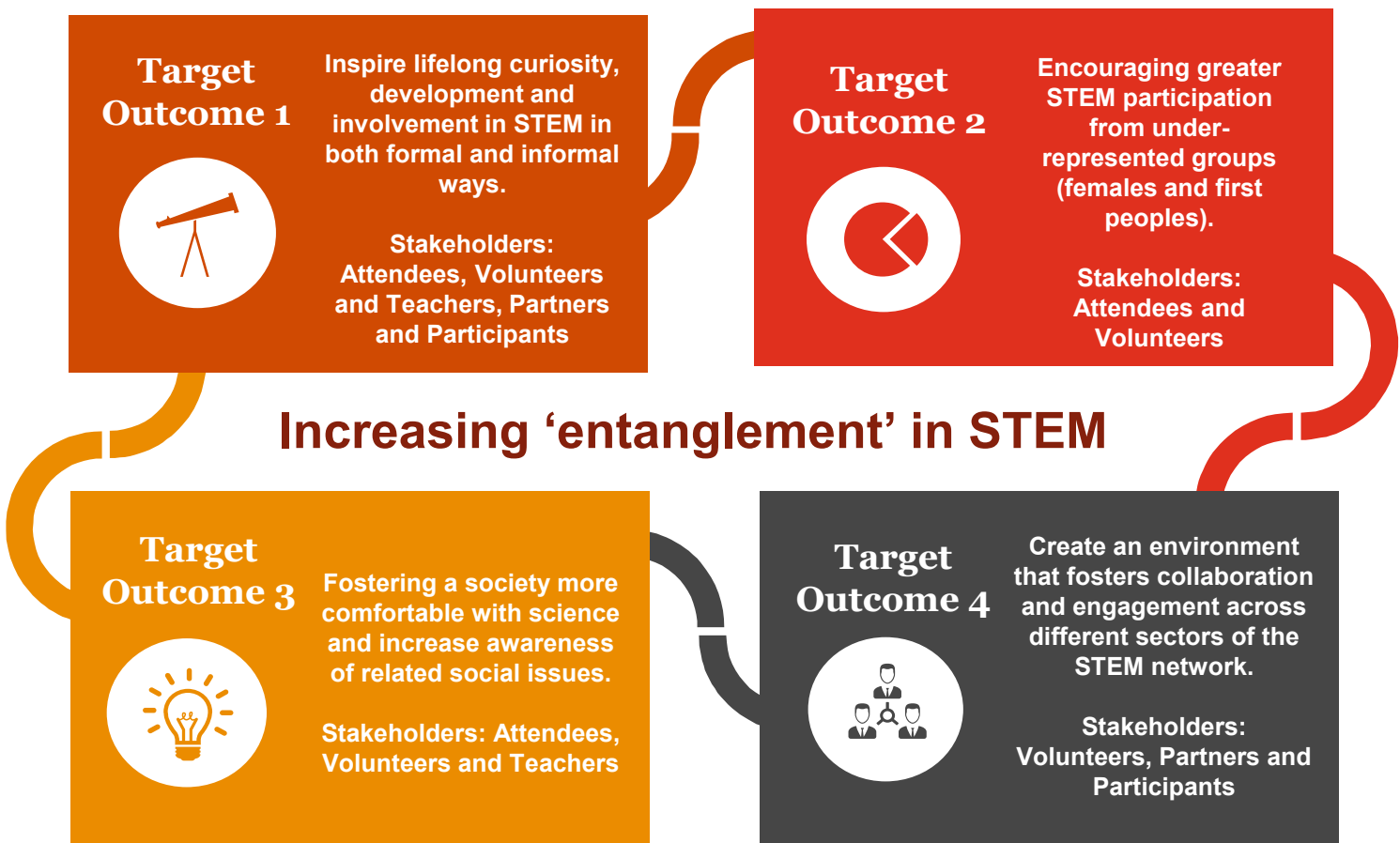
World Science Festival's mission is 'A general public informed by science, inspired by its wonder, convinced of its value, and prepared to engage with its implications for the future'. This mission is underpinned by five primary objectives. Of these primary objectives, 'Increase "entanglement" in STEM for a broader general audience', was key to identifying the target outcomes for this evaluation. In collaboration with QMN and WSFB, PwC developed an evaluation framework, synthesised the target outcomes to increase 'entanglement' in STEM and identified the relevant stakeholder groups.

The evaluation framework considers the opportunity that each target outcome presents, the activities employed by WSFB to harness the opportunity, and the desired impacts of those activities. The impacts, as they relate to five different stakeholder groups, act as key performance indicators for the achievement of target outcomes.

The impact of WSFB on each target outcome was determined based on data collected from various surveys distributed to stakeholder groups during and after

WSFB 2019. Questions were specifically included in the surveys for the purpose of this assessment and were designed to measure the achievement of the key performance indicators identified by the evaluation framework. Whether or not a specific impact can be identified by quantifying positive/affirmative responses to related questions, will provide insight into the achievement of target outcomes across geographies and demographics.

This report provides a baseline assessment of the impact of WSFB 2019 on STEM engagement and learning outcomes. It is important to note that survey responses only provide a snapshot of short term impacts, at a point in time and as such do not capture the long term impacts of WSFB. A qualitative assessment, such as this, is best conducted over a longer period where outcomes can be measured against baseline results over time. That said, this assessment also captures comments from stakeholder groups that may inform the future activities conducted by WSFB to achieve desired outcomes.





Target Outcome 1

General willingness to participate and excitement for science are the first and arguably most important steps in fostering curiosity and involvement in STEM. Attendees and volunteers reported to feeling more willing to learn more about science, as well as excited and enthusiastic about science as a result of attending WSFB 2019. The analysis also suggests STEM engagement among children is strong in comparison to other attendees, especially in terms of awareness of career and study pathways and the desire to engage with and learn more about science. This indicates WSFB may lead to young people pursuing study and or careers in STEM.

Partners and participants also acknowledged the importance of WSFB and the contribution it makes to STEM engagement and learning.

Target Outcome 2

Encouraging engagement in STEM is the first step to greater participation from under-represented groups, and their higher levels of reported engagement shows the significant impact of WSFB on these groups. Under-represented groups' engagement with and willingness to participate in science as a result of attending WSFB 2019 was often higher than majority groups. Similarly, a higher proportion of volunteers from under-represented groups either agreed or strongly agreed that they acquired new skills and renewed enthusiasm for science in comparison to majority groups.

Seeing "people like me" was not a significant indicator of the engagement of under-represented groups*. Instead, indicators such as the willingness to learn more, and awareness of career and study pathways are indicative of most, if not all, locations. Attendees in Brisbane - which yielded the largest and most diverse survey group - reported that they felt more informed and comfortable with science as a result of attending WSFB 2019.

*Measured in Ipswich and Toowoomba

Target Outcome 3

Fostering a society that is informed and comfortable with science, and consequently willing to learn more and become inspired by it, helps build a community interested in solving the key challenges confronting the world today. Both attendees and volunteers in Brisbane reported to feeling more informed, and aware of science related social issues, and as a result feel more comfortable having conversations and making decisions about science. Similarly, attendees in Chinchilla and Gladstone reported that WSFB 2019 helped with understanding how science is used in the real world. These consistent results, across attendees with and without children, attending free and paid events, demonstrates the accessibility and breadth of WSFB offerings.

Target Outcome 4

WSFB networking opportunities provide a platform to engage the different sectors of the STEM network for the purpose of collaboration in future research and commercialisation of ideas and inventions. Partners and participants acknowledged the existence of these opportunities throughout WSFB 2019 as well as the importance of WSFB and the contribution it makes to STEM engagement and learning.



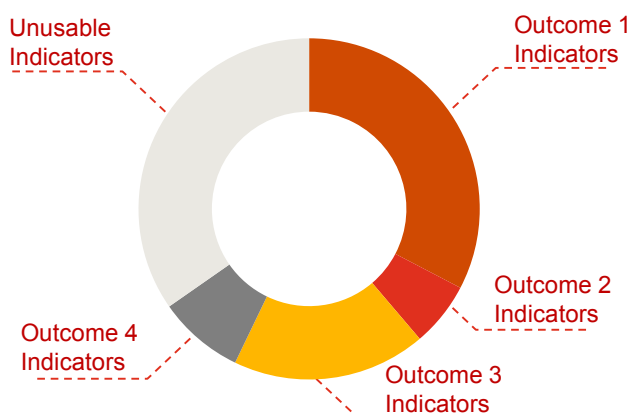
Survey Analysis

WSFB 2019 comprised a flagship event in Brisbane (18-24 March) and regional engagement in Gladstone (1-2 March), Townsville (8-9 March), Ipswich (17-18 March), Toowoomba (22-23 March) and Chinchilla (29-30 March). Forty-nine key performance indicators were measured by questions included in the various WSFB 2019 surveys. These indicators covered all four target outcomes and the five stakeholder groups: attendees, volunteers, teachers, partners and participants. A full list of these indicators, their sample size and results can be found in Appendix B.

For attendees, 1,208 survey responses were collected using eight separate surveys across all six Festival locations. There were two surveys conducted in both Brisbane and Townsville. The data collected represented approximately one per cent of total attendance at the 2019 Festival. Although fewer responses were collected from volunteers, teachers, partners and participants, they represented larger samples of their respective populations.

Any indicator with a sample size less than 30 was excluded from our analysis. The requirement for a sample size over 30 is a general rule of thumb for statistical analysis. A sample size less than 30 responses might not accurately reflect a reasonable proportion of total WSFB stakeholders on which to draw conclusions. Similarly, indicators reflected by an

average survey response of close to neutral were considered inconclusive. An average response of neutral, gives no indication to the opinion of respondents. For the most part inconclusive indicators were not used in analysis, similar to unreliable indicators, unless they formed an interesting comparison to more conclusive indicators, or reflected an above average sample size.



A total of 32 indicators were suitable for assessment (see Appendix A). This includes indicators relating to attendees, volunteers, partners and participants across all target outcomes.

Why are there different numbers of indicators per outcome?

There are a different number of indicators per outcome depending on the breadth of the outcome. For example, there is a significantly larger number of Outcome 1 indicators than Outcomes 3 and 4. This reflects that Outcome 1, as the desire to foster lifelong engagement with STEM, is a difficult target outcome to measure, and can be considered from different perspectives as either formal or informal engagement. Conversely, Outcome 3 and 4 have somewhat narrower definitions and can be measured through more direct questioning of respondents. Outcome 1 also covers all stakeholders, whereas Outcome 3 impacts only attendees, and volunteers, and Outcome 4 impacts volunteers, partners and participants. Outcome 2 is different to the other indicators, as it takes a subsection of Outcome 1 and 3, by considering only the engagement of under-represented groups. This means that while it may have fewer specific indicators than the other outcomes, measurement can be extended by considering the composition of responses from any Outcome 1 or 3 indicators with a large enough sample size.





Outcome 1

**Inspire lifelong curiosity,
development and
involvement in STEM in both
formal and informal ways**



Target Outcome 1 is aimed at increasing stakeholder's appreciation and understanding of science and their awareness and level of comfort with science related topics and study and career pathways in STEM. This Outcome is the widest reaching of all four outcomes, and covers all five WSFB stakeholder groups: attendees, volunteers, teacher's partners and participants.

The actions taken toward the achievement of Outcome 1 at the 2019 Festival included:

- Specific events focused on non-traditional, more interactive approaches to learning, such as Street Science, Regional Events and Festival Labs, and;
- programs informed by current research, scientific and technological discoveries and important current and future issues confronting the world, particularly through Salons and Conversations.

The WSFB 2019 program aimed to increase the accessibility of events across all locations, showcasing the best of science and the future of science through free and paid events.

“ The World Science Festival Brisbane is a fantastic opportunity to shine the spotlight of science, technology, engineering and mathematics, particularly for young students. The Festival offers a great variety of events and locations, providing many different options, no matter where you live, your work/study commitments, or interests. To increase engagement within the STEM field, events, such as the Science Festival, are a must, to grow and develop young minds in this field. ”

- Brisbane (QTIX Survey)

As a result of WSFB 2019, attendees and volunteers are more excited, and willing to learn about science, children had greater awareness of STEM study and career pathways and partners and participants unanimously agreed that the WSFB makes an important contribution/is an important mechanism for STEM engagement and learning.

Survey results show consistent positivity toward the WSFB 2019 offering.

In fact, **85%**

of all attendees* said they would be most likely to recommend WSFB to their friends and family.

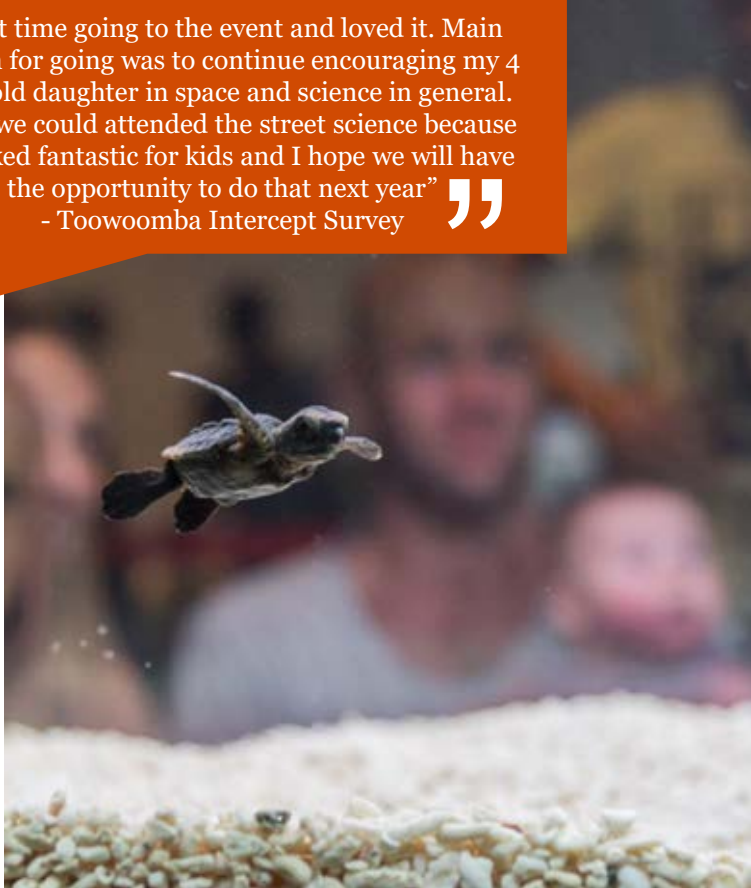
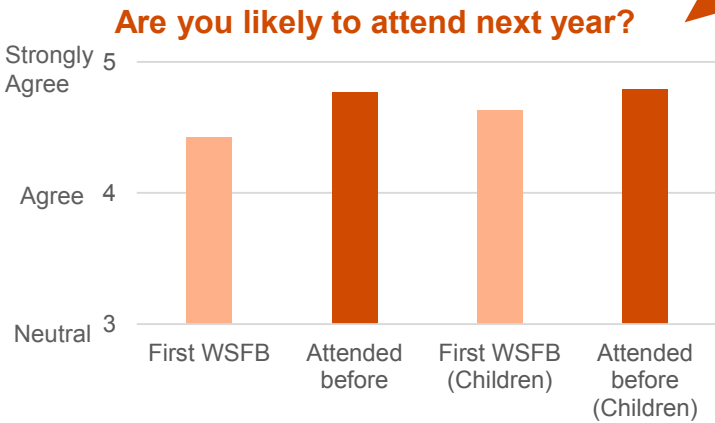
*Excludes Gladstone and Chinchilla

Attendees



In all Festival locations, a large proportion of attendees responded that they would attend WSFB again, particularly if they had attended before. Survey results show a significant interest in the annual offering of WSFB, especially for attendees with children.

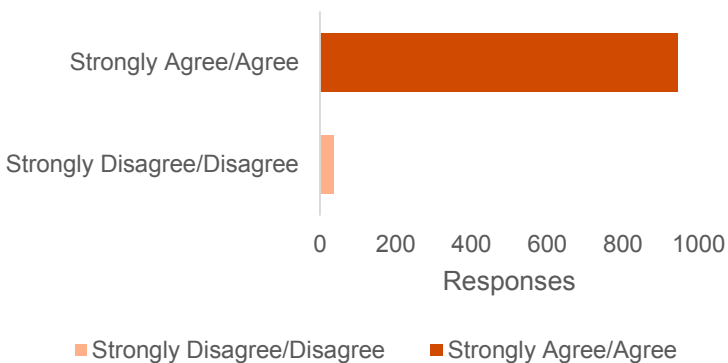
“First time going to the event and loved it. Main reason for going was to continue encouraging my 4 year old daughter in space and science in general. Wish we could attended the street science because it looked fantastic for kids and I hope we will have the opportunity to do that next year”
- Toowoomba Intercept Survey



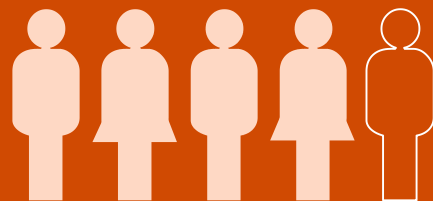
Attendees are not necessarily attending WSFB 2019 to gain a better understanding of or engage more with science, however, this is more often than not the unintended outcome of their attendance.

As a result of attending WSFB 2019 attendees reported an increased willingness to learn more about science and or the topic/s covered at the events. Attendees also agreed WSFB 2019 made them want to learn more about science, and were 94% likely to also agree that WSFB 2019 made them more excited about science.

“WSFB 2019 made me want to find out more about science/the topics covered in today’s events”



What about groups with children?



4 out of 5 attendees with children indicated the main reason for attending WSFB 2019 was to gain a better understanding of or engage more with science, compared to only 2 in 5 attendees without children.

As a result of attending WSFB 2019, **85%** of parents/caregivers in Toowoomba also agreed they were more willing to encourage their children to participate in STEM.

“What was your favourite part of the day?”



“Seeing the kids really enjoy themselves while learning!”
– Gladstone Community Day Survey

“Watching my kids enjoy it!”
– Gladstone Community Day Survey

“Besides being so informative, it was the look of excitement on my grandchildren's faces as they watched in awe.”
– Gladstone Community Day Survey

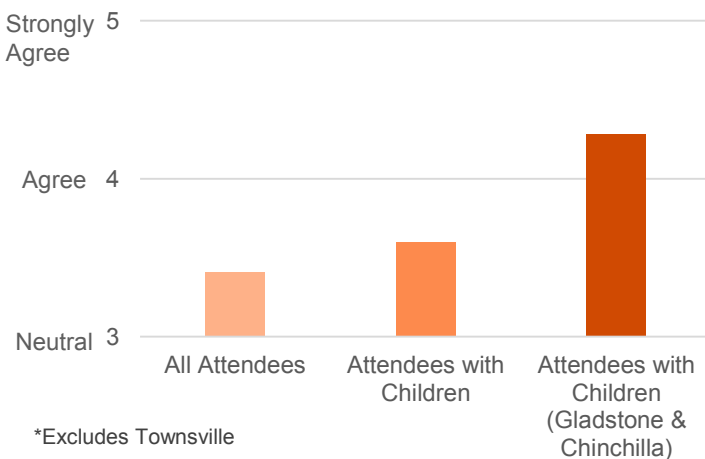
Survey results indicate that WSFB is successful in encouraging STEM engagement through non-traditional learning approaches. Notably the results for groups with children – likely to be answering as a proxy for children, performed above average.

“I love the fact that the World Science Festival visited Townsville. It is a great way to engage people’s interest and curiosity in science, particularly for younger people to encourage them into STEM as a career.”

- Townsville Intercept Survey

In the regional locations – Townsville, Ipswich, Toowoomba and in particular Gladstone and Chinchilla – a narrower selection of events like Cool Jobs, Street Science and Dr Karl were offered, as opposed to Brisbane. The events offered highlighted STEM careers and study pathways. Consequently, when it came to survey questions about careers and study pathways, attendees answering as a proxy for their children gave the most positive responses.

“I am more aware of science career and study pathways”*

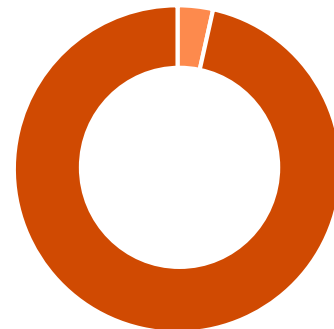


Over 80%

of attendees with children in Brisbane and Toowoomba reported that Festival events were accessible, engaging and interesting to their children.

Survey results collected from Gladstone and Chinchilla events reflected almost unanimous agreement that Queensland Museum Network is an authority on STEM.

“I see Queensland Museum [Network] as an authority in STEM education and engagement.”*



■ Strongly Disagree/Disagree ■ Strongly Agree/Agree

*Gladstone and Chinchilla only

As a trusted source on STEM knowledge, the willingness to learn more about science as a result of WSFB 2019, especially by children, is almost 10% stronger in Chinchilla and Gladstone than in all other locations. This result is likely due to the targeted engagement in these areas as a result of the Future Makers program delivered in conjunction with the Shell QGC project.

Volunteers



The majority of volunteers chose to volunteer at WSFB 2019 because it is something they are passionate about.

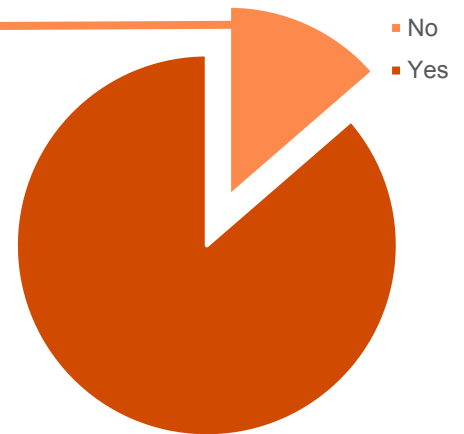
Volunteers indicated they had an increased understanding of STEM related areas, and agreed they also intended to learn more about science as a result of participating in WSFB 2019. Volunteers did not indicate they were more aware of career and study pathways available in STEM as a result of attending WSFB 2019.

This response rate in volunteers (and potentially other attendees) may relate to a pre-existing level of awareness. For example, someone with a career in STEM or active in STEM education might not agree they are more aware of STEM careers as a result of attending WSFB 2019 despite benefiting in other ways, such as general engagement or enthusiasm.

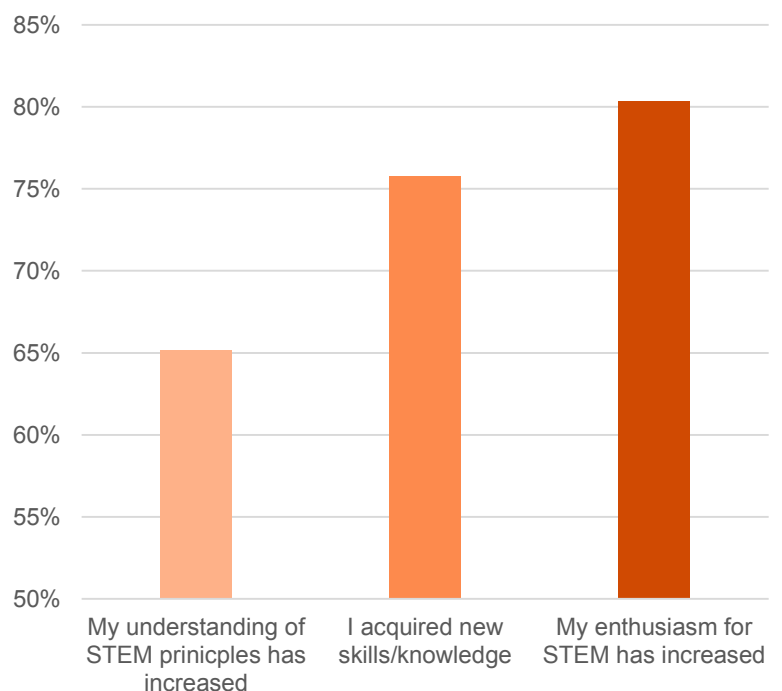
“I chose to volunteer at WSFB 2019 because of the opportunity to be involved in something I am passionate about”



- Opportunity to network with WSFB participants and STEM industry professionals.
- Learn more about STEM related topics
- Opportunity to meet like-minded people/make friends.



“As a resulting of volunteering at WSFB 2019...”





Partners & Participants



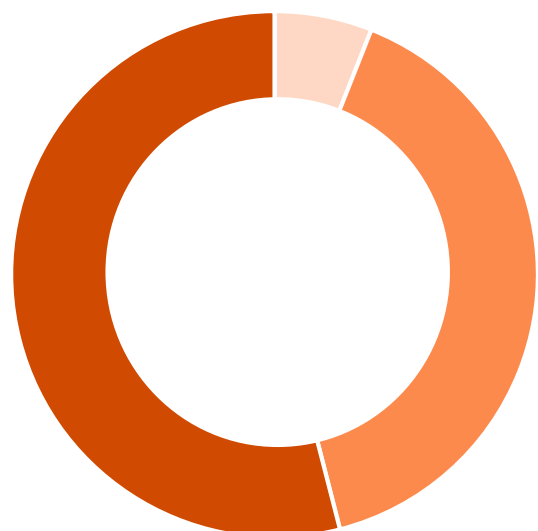
Partners and participants are involved with WSFB for a myriad of reasons. The top three reasons for partnership as indicated by 2019 WSFB partners were

- to promote STEM and literacy and engagement
- to build brand awareness through visibility and logo exposure
- for opportunities to network and engage with STEM-related sectors

As participants and organisations are typically involved in the promotion of STEM engagement and learning outcomes, strong performance indicators for the achievement of Outcome 1 are not surprising.

Regardless of whether or not the promotion of STEM literacy and engagement is a major reason for choosing to engage with WSFB 2019, most partners and participants agree that the WSFB makes an important contribution/is an important mechanism for STEM engagement and learning.

“The WSFB makes an important contribution/is an important mechanism for STEM learning and engagement.”



■ Neutral ■ Agree ■ Strongly Agree



Outcome 2

Encouraging greater STEM participation from under-represented groups



Target Outcome 2 is about encouraging greater STEM participation from under-represented groups. For the purpose of measuring this Outcome, under-represented target groups for STEM are considered to be females and first nation's peoples. Target Outcome 2 seeks to realise similar impacts to Outcome 1 and 3 for a broad audience, but focuses on STEM engagement of these under-represented groups.

WSFB 2019 initiatives designed to achieve Outcome 2 include:

- the Queensland Women in STEM prize
- programming included as a part of the annual STEM Girl Power Camp
- sponsoring delegations of regional and remote Aboriginal and Torres Strait Islander students to attend WSFB 2019
- live streaming of education programs for regional and remote communities

The indicators specifically included in surveys to consider Outcome 2 resulted in average neutral/agree responses from both attendees and volunteers.

WSFB focused effort to ensure under-represented groups were well represented as participants and moderators at events such as Salons, Conversations and Signature Events. Despite this, both volunteers and attendees from under-represented target groups did not strongly report that witnessing STEM participants they could identify with had a positive impact on their willingness to participate in STEM.

Alternatively, where the under-represented groups' survey results particularly stand out is when compared to the results of majority groups for Outcome 1 and 3 indicators. Comparing the results of specific indicators for majority groups to the results of under-represented groups provides further insight into the achievement of Outcome 2.

Attendees

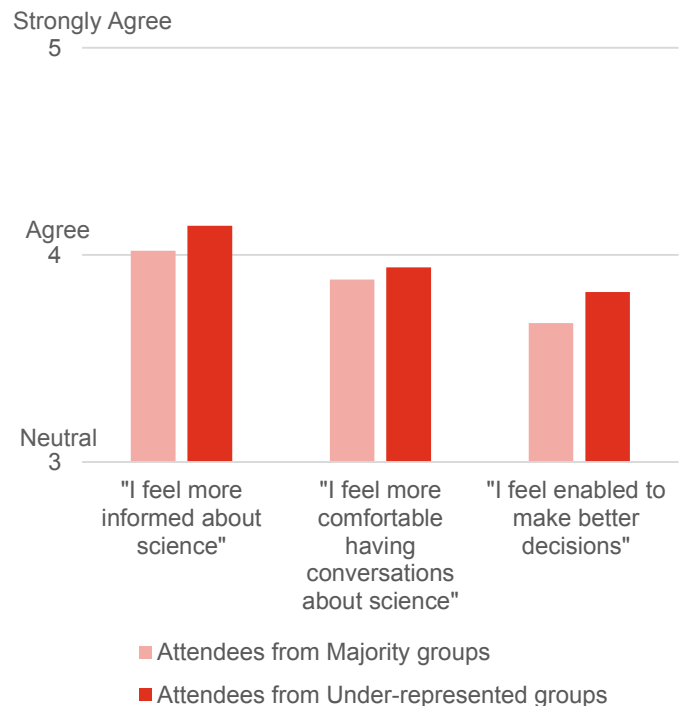


Survey results for under-represented target groups are often similar if not better, than results from majority groups. For example, comparing the results of attendees' willingness to learn more about science as a result of attending WSFB 2019, shows a larger positive impact on attendees from under-represented target groups than majority groups. For example, attendees from under-represented groups in Brisbane gave more positive responses in terms of feeling more informed about and more comfortable with science.

86% > 81%

86% of attendees from under-represented target groups indicated their willingness to learn more about science as result of WSFB 2019 compared to only 81% of attendees from majority groups

"As a result of attending the Festival..."



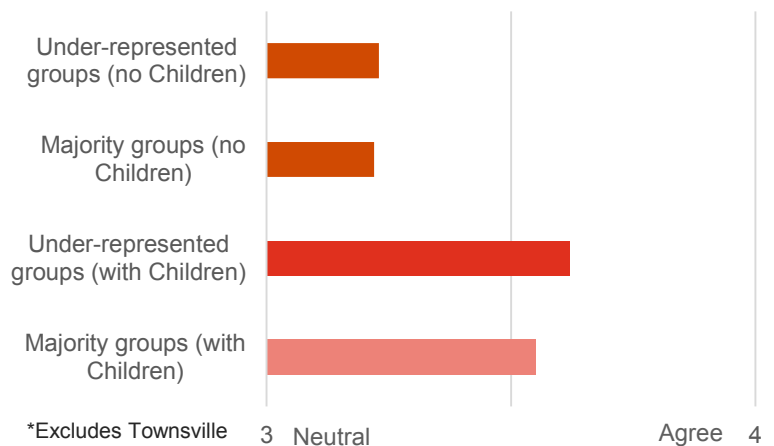


“ Visiting the Science fair has inspired my daughter and given her ideas for her future career. ”

– Brisbane Intercept Survey

"I am more aware of science career and study pathways"

Under-represented groups also purport to leave WSFB 2019 having gained more knowledge on STEM career opportunities and pathways than majority groups. However, consistent with the broader audience, their willingness to participate in STEM outperforms engagement with career opportunities and pathways. This is consistent across groups who attended with and without children, noting that some respondents will be answering as a proxy for children. Like with Outcome 1, awareness of career pathways remains highest for those attendees with children.



Volunteers



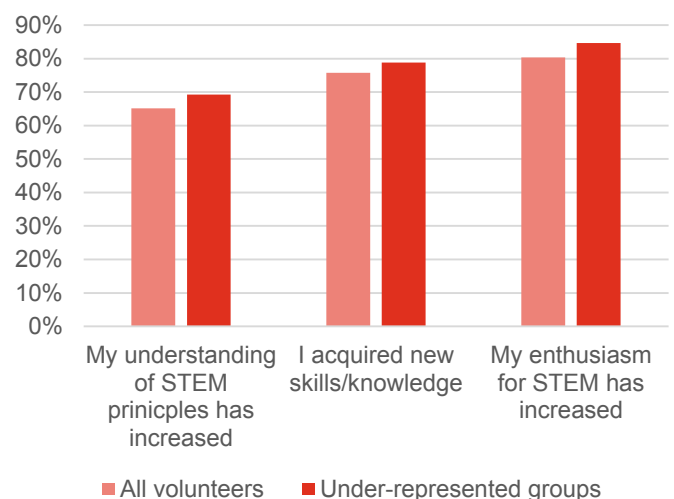
Volunteers from under-represented groups had more positive outcomes as a result of WSFB 2019, than the group average. For example, as a result of WSFB 2019 a greater proportion of volunteers from under-represented groups purported to gaining new skills, knowledge and enthusiasm for STEM, than volunteers from majority groups.

"As a resulting of volunteering at the Festival..."

Volunteers from under-represented groups also reported a response

3-4% higher

than average for questions relating to feeling more informed about and comfortable with science/discussing science.



Outcome 3

Fostering a society more comfortable with science and increased awareness of social issues





Target Outcome 3 is aimed at fostering a society more comfortable with science and increasing awareness of related social issues. The desire is for attendees and volunteers to feel more comfortable engaging in conversations or debates regarding science and related issues confronting the world and feel more comfortable making informed decisions regarding current, topical issues.

Outcome 3 presented some of the strongest indicators of all target outcomes, although coverage is less consistent across all 6 Festival locations. Outcome 3 predominantly reports on the Brisbane sample, a large sample size, with representative proportions of attendees with/without children attending ticketed and non-ticketed events. These results are likely to be reflective of the overall Festival.

Outcome 3 relates to the results of Outcome 1, as excitement and willingness to participate in science goes hand in hand with feeling more comfortable, and informed about science and related societal issues.

Both attendees and volunteers reflected that as a result of WSFB 2019 they felt more informed, and aware of science and science related social issues, and consequently they felt more comfortable having conversations and discussions about science.

WSFB 2019 initiatives designed to achieve Outcome 3

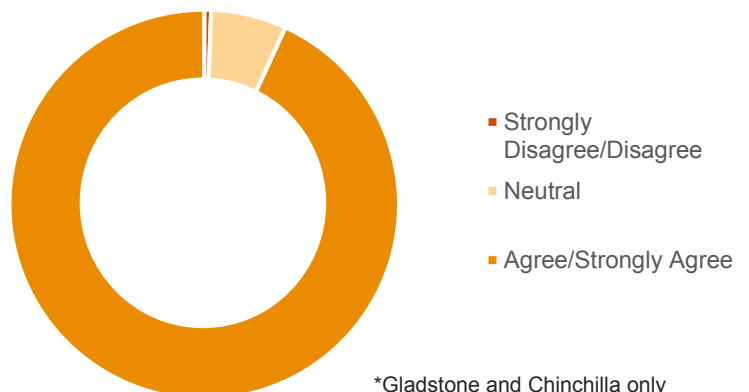
- Programming focused on current, topical issues confronting the world today
- Engaging content tailored to be digestible for a more general audience
- Non-traditional, more interactive approaches to learning
- A range of free or low cost events to increase WSFB accessibility

Attendees



Most Festival attendees in Gladstone and Chinchilla reported to better understand how science is used in the real world.

"This event made me realise how science is used in the real world"**



*Gladstone and Chinchilla only



“

I am a local. Already very interested and engaged in science so the Festival adds to my existing interest and knowledge base. Curiosity and the Festival are great initiatives to bring people into Brisbane.

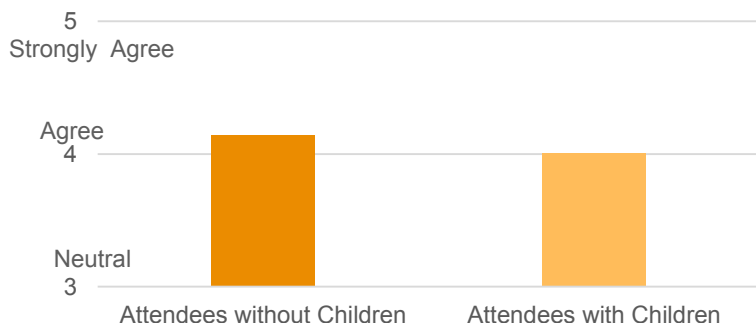
– Brisbane Intercept Survey

”

The Brisbane survey responses show that attendees self-reported to feeling more informed regarding STEM and related current issues. This result was higher again in under-represented groups (shown in Outcome 2), although marginally lower for groups with children.

Attendees also reported as being able to make more informed decisions after attending WSFB 2019.

"I feel more informed about science and current issues"



3 in 4 attendees agree that attending WSFB 2019 allows them to make more informed decisions

Being more informed about science and making more informed decisions are a positive outcome of WSFB 2019. The results across all attendees highlights the accessibility of events. This enables stakeholders of all ages and experiences to make better decisions, informed by a knowledge of science and related societal issues.

This result is interesting given the trend shown in other outcomes where survey responses from attendees with children were higher than average results.

What about the other locations?

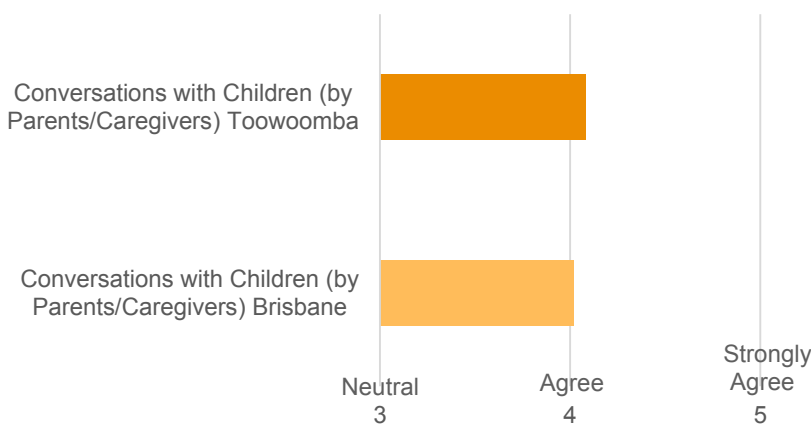
The more informed you are, the more willing you might be to engage and participate in the discussion about science and related societal issues. Consequently Outcome 3 can be compared to Outcome 1 indicators which provided a broader view of WSFB 2019 across all 6 locations.

94% of Brisbane attendees that 'agree' or 'strongly agree' to questions about their excitement and willingness to participate in science, also 'agree' or 'strongly agree' with feeling more informed about science and current issues. This same result could be inferred across the other locations.

Attendees purport to feeling more comfortable having conversations and discussions with others regarding science and science related social issues, especially when it comes to children. This a positive reflection of the continued engagement of children by parents and caregivers beyond WSFB.

Toowoomba performed slightly better than Brisbane, in terms of having conversations with children. This is likely to be reflection of the composition of events in Toowoomba as compared to Brisbane – where more events were specifically targeted at children in Toowoomba.

“I feel more comfortable engaging in conversations with others regarding science and current issues”

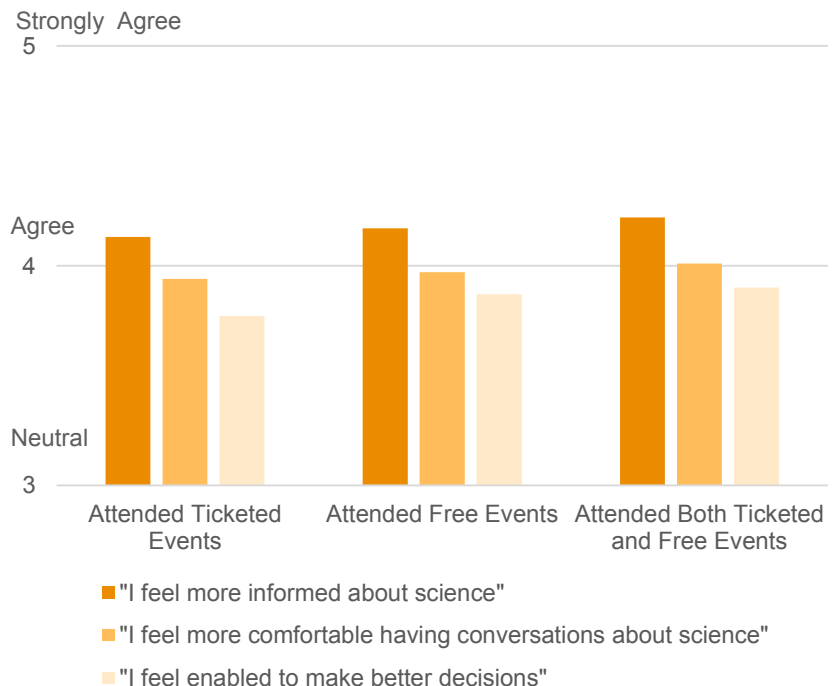


What about the difference between those attending ticketed vs. free events?

On average, individuals who only attended ticketed events attended at least two different WSFB 2019 events, whereas those who did not purchase tickets, and only took part in free events (i.e. Street Science!), only attended once.

Results across the two groups were similar, with free events out performing ticketed events in terms of attendees comfort and understanding of STEM.

Attendees that attended a mix of both ticketed and free events reported the best outcomes.

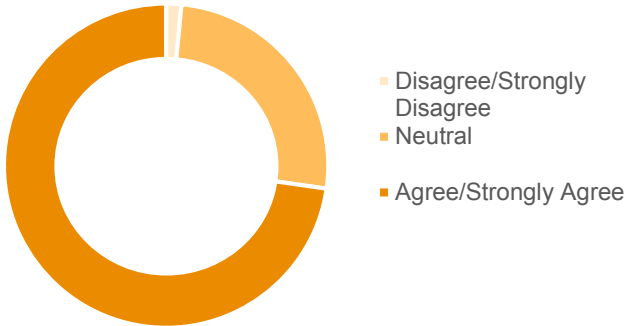


Volunteers



Volunteers report feeling more engaged as a result of volunteering at WSFB 2019.

“I am more engaged with science”



Results across other Outcome 3 indicators, in terms of feeling more informed, more comfortable having conversations and the ability to make more informed decisions each presented average ‘agree’ responses.

Volunteers agree to feeling more informed about science as a result of volunteering at WSFB 2019. They also indicated that they feel more comfortable having conversations about science, and are enabled to make better decisions as a result of their volunteering experience, however, the results were not as high as feeling more informed.

“As a result of volunteering at WSFB...”



Outcome 4

Create an environment that fosters collaboration and engagement across different sectors of the STEM network





Target Outcome 4 is about creating a platform that engages different sectors of the STEM network for the purpose of collaboration in future research and commercialisation of ideas and inventions. Survey responses from the 2019 WSFB surveys consider the existence of networking opportunities as a reflection of the platform for partners, participants, volunteers.

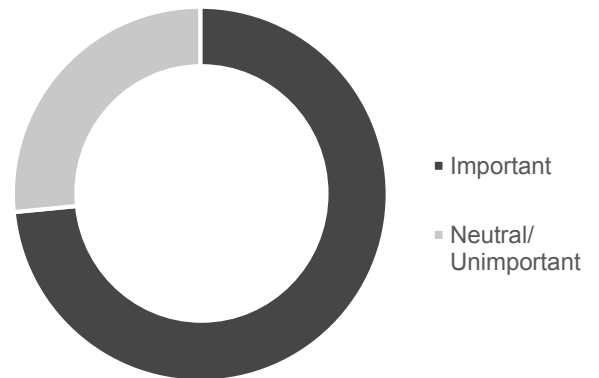
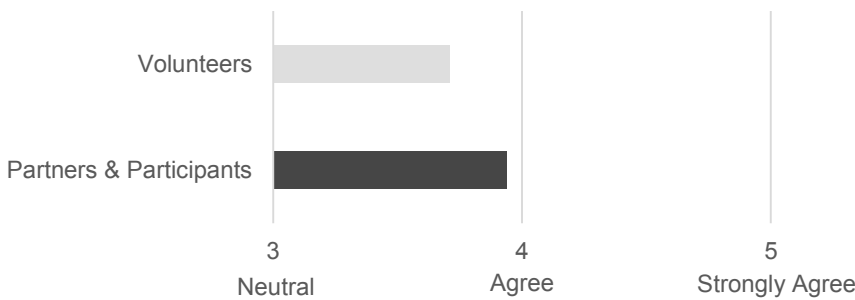
Partners & Participants



For partners and participants, the opportunity to network and engage with other STEM related sectors (professionals and participants), was acknowledged as an important and provided partnership or participation benefit.

“How important is networking (with WSFB participants, industry professionals and other partners) as a partnership benefit?”

“The Festival provided me with opportunities to network with World Science Festival Brisbane partners, participants and STEM industry professionals”

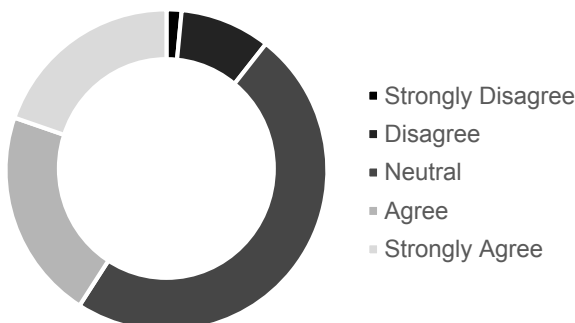


Volunteers



Volunteers agreed that opportunities to network with WSFB participants and STEM industry professionals were provided by WSFB 2019. Although, a majority of neutral responses may indicate that this benefit is less important to volunteers or the question requires rephrasing.

“Volunteering at World Science Festival Brisbane enabled me to make valuable new contacts and network”





Appendix A: All Indicators by Outcome, Response and Sample Size

Figure 1 shows all indicators by Outcome, average response and sample size and illustrates which indicators were considered reliable for analysis. Indicators in the green shaded, right hand quadrant are considered reliable positive indicator and have been assessed in this report. There were no reliable, negative indicators in the red shaded, right hand quadrant although these would have also been suitable for assessment. Other indicators, such as those classified as unreliable or inconclusive, are not suitable for assessment. They either have a sample size less than 30, and/or considered inconclusive due to an average neutral response (grey shaded triangle).

Figure 1. All Indicators, by Outcome, Average Response and Sample Size



Appendix B: Survey Results – All Indicators

Note: Results presented as an average response reflect a range: Strongly Disagree (1) – Strongly Agree (5).

Target Outcome 1 - Inspire lifelong curiosity, development and involvement in STEM in both formal and informal ways				
Indicator	Stakeholder	Result	Sample Size	Location (Attendees Only)
A large proportion of attendees purport to having attended the Festival previously or indicate a willingness to attend the Festival again in future	Attendees	36% have visited previously, 82% would visit again	358	B, I, TA
Proportion of attendees indicating a primary reason behind attending the Festival was to gain a better understanding of/engage more with science	Attendees	54% indicate as a primary reason	1208	B, I, TA, TE, C, G
Proportion of attendees purporting that a career in science is a more viable option after attending the Festival	Attendees	23% purport a career is more viable	670	B
Attendees report having a greater awareness and understanding of study and career pathways in science as a result of the Festival	Attendees	3.41 average response	993	B, I, TA, C, G
Proportion of attendees purporting to be more excited about science as a result of attending the Festival	Attendees	85% purport to being more excited	597	B
Attendees express a willingness to learn more about science and/or the topics covered at the event as a result of attending the Festival	Attendees	4.16 average response	1141	B, I, TA, TE, C, G
Proportion of attendees (with children) indicating a primary reason behind attending the Festival was to gain a better understanding of/engage more with science	Attendees	77% indicate as a primary reason	584	B, I, TA, TE, C, G
Proportion of attendees (parents/caregivers) who indicate a willingness to encourage children to participate in STEM after the Festival	Attendees	85% indicate a willingness	59	TA
Attendees (with children) deem that the Festival content was delivered in a way that was accessible and engaging way for children	Attendees	4.12 average response	224	TA, B (QTIX only)
Proportion of attendees (parents/caregivers) reporting that content engaged and interested their children (proxy for children)	Attendees	90% reported engaging content	224	TA, B (QTIX only)
The Festival attracts a large proportion of attendees who have not conducted formal study in STEM	Attendees	74% have not conducted study	160	I, TA
Proportion of attendees who view Queensland Museum (QM) as an authority in STEM education and engagements	Attendees	84% view QM as an authority in STEM	164	C, G

(CONT.) Target Outcome 1 - Inspire lifelong curiosity, development and involvement in STEM in both formal and informal ways

Indicator	Stakeholder	Result	Sample Size	Location (Attendees Only)
Proportion of partners indicating the ability to promote STEM literacy and engagement as a major reason for partnering with WSFB	Partners	53% indicate as a major reason	32	
Partners and participants indicate that WSFB makes an important contribution/is an important mechanism for STEM engagement and learning	Partners and Participants	4.48 average response	50	
Proportion of volunteers intending to learn more about science as a result of attending the Festival	Volunteers	74% indicate intent to learn more	66	
Volunteers indicate that the opportunity to 'learn more about STEM' as a major reason for choosing to volunteer at WSFB	Volunteers	52% indicate as a major reason	66	
Volunteers purport to being more aware of the career and study pathways and options available in STEM	Volunteers	3.65 average response	66	
Volunteers indicate gaining an increased understanding and knowledge of STEM related areas as a result of attending the Festival	Volunteers	Average responses; 4.05 (new skills), 3.8 (understanding STEM principles), 4.08 (enthusiasm).	66	
Volunteers indicate that a major reason for volunteering at WSFB is the opportunity to be involved in something they're passionate about (science and/or STEM)	Volunteers	86% indicate as a major reason	66	
Teachers indicate learning something new about STEM as a result of attending the Festival	Teachers	3.86 average response	7	
Teachers indicate that the event programming linked well to curriculum	Teachers	3.86 average response	7	
Teachers purport to gaining new inspiration and/or ideas for teaching STEM to their students	Teachers	4.0 average response	7	
Teachers indicate that their students were clearly engaged by the event(s) attended	Teachers	4.14 average response	7	
Proportion of teachers indicating that the event programming provided valuable learning experiences for students	Teachers	71% indicate content was valuable	7	
Teachers indicate that the WSFB content covered in the was accessible for students	Teachers	4.29 average response	7	
Teachers indicate that their students were inspired after attending the events/programs	Teachers	4.29 average response	7	
Teachers indicate that WSFB makes an important contribution/is an important mechanism for STEM engagement and learning	Teachers	4.43 average response	7	

(CONT.) Target Outcome 1 - Inspire lifelong curiosity, development and involvement in STEM in both formal and informal ways

Indicator	Stakeholder	Result	Sample Size	Location (Attendees Only)
Proportion of partners (particularly universities) that received interest or inquiries regarding their STEM-related program offerings as a result of being involved in WSFB	Partners	33% received interest/enquiry	3	
Festival participation has provided new inspiration for participants' work/research	Participants	4.17 average response	18	
Participants reported that content was delivered in an accessible but challenging way	Participants	4.5 average response	16	
Participants report being engaged by the topics covered during the Festival	Participants	4.65 average response	17	

Target Outcome 2 - Encouraging greater STEM participation from under-represented groups

Attendees from under-represented target groups purport to having a greater awareness and understanding of study and career pathways in science as a result of the Festival	Attendees	3.44 average response	647	B, I, TA, C,G
Attendees from under-represented target groups indicate that witnessing STEM participants at WSFB that they can identify with has had a positive impact on their willingness to participate in STEM (from general engagement to career aspirations)	Attendees	Average responses: 3.14 (career aspirations), 3.48 (general engagement)	620	B, I, TA
Volunteers from under-represented target groups (women and first nations peoples) indicate that witnessing STEM participants at WSFB that they can identify with has had a positive impact on their willingness to participate in STEM (general engagement and career aspirations).	Volunteers	Average responses: 3.58 (career aspirations), 3.73 (general engagement)	52	

Target Outcome 3 - Fostering a society more comfortable with science and increase awareness of related social issues

Proportion of parents and caregivers purport to feeling more comfortable having conversations and discussions with their children regarding science issues confronting the world (Brisbane QTIX only)	Attendees	75% purport to feeling more comfortable	224	TA, B (QTIX only)
Attendees purport to feel more comfortable having conversations and discussions with others regarding science and science related social issues	Attendees	73% purport to feeling more comfortable	597	B
Proportion of general attendees that self report to feeling more informed regarding STEM and related current issues	Attendees	85% report to feeling more informed	597	B
Attendees purport to be able to make more informed decisions as a result of attending the Festival	Attendees	3.77 average response	597	B

Target Outcome 3 - Fostering a society more comfortable with science and increase awareness of related social issues

Indicator	Stakeholder	Result	Sample Size	Location (Attendees Only)
Attendees gain a better understanding of how science is used in the real world as a result of attending the Festival	Attendees	4.35 average response	175	G, C
Volunteers purport feeling more comfortable having conversations and discussions with others regarding science and/or science related social issues	Volunteers	3.86 average response	66	
Proportion of volunteers that self report to feeling more informed regarding STEM and related challenges confronting the world today	Volunteers	76% report to feeling more informed	66	
Proportion of volunteers that self report to being able to make more informed decisions regarding STEM and related challenges confronting the world that were covered at the Festival) as a result of volunteering at WSFB	Volunteers	67% report to being able to make informed decisions	66	
Volunteers report being more engaged with science/STEM as a result of volunteering at the Festival	Volunteers	3.97 average response	66	
Proportion of teachers indicating that WSFB covers important topics and issues impacting the world	Teachers	71% indicate important topics were covered	7	

Target Outcome 4 - Create an environment that fosters collaboration and engagement across different sectors of the STEM network

Partners and participants indicate opportunity was provided to network with other STEM related sectors (professionals and participants)	Partners and Participants	3.94 average response	50	
Partners and participants indicate the importance of networking and engaging with other STEM related sectors (professionals and participants) as a partnership/participation benefit.	Partners and Participants	3.94 average response	49	
Proportion of volunteers indicating networking as a major reason for volunteering at WSFB	Volunteers	56% indicate as major reason	66	
Volunteers report that the Festival provides opportunities to network with WSFB participants and STEM industry professionals	Volunteers	3.71 average response	66	
Proportion of volunteers indicating that volunteering at the Festival enabled them to make valuable contacts and networks (with STEM-related sectors)	Volunteers	41% indicate enabled to make connections	66	

Appendix C: Future Learnings

A key focus for future impact assessments should be about increasing the quantity and diversity of responses, across all stakeholder groups. Other key learnings from the WSFB 2019 assessment that will enhance future analysis are described below.

Refine survey questions to limit neutral responses

In some cases WSFB 2019 survey results may have been impacted by the structure or wording of the survey questions. For example, when asking attendees and volunteers about awareness of study and career pathways, a significant number of responses were neutral. This could reflect that respondents have pre-existing engagement in STEM, and therefore are unlikely to perceive that they are *more* aware of career and study pathways – instead, they may be able to comment on the accessibility of event content.

Include key indicators in all attendee surveys (in all Festival locations)

Key indicators such as, excitement for STEM as a result of attending WSFB 2019 and measuring attendees comfort having conversations about

science and making decisions, were not included in all Festival surveys. The inclusion of key indicators in all surveys, or at least a proxy for them, will provide a clearer picture on the STEM engagement and learning impact of WSFB, and increase the applicability of findings across all Festival locations. It may not be possible to include all indicators in all surveys, however ensuring the minimum comparability of findings across locations will limit gaps in assessment.

Expand indicators for Outcome 4

Indicators for Outcome 4 in WSFB 2019 surveys only included information on networking. Broadening the indicators to include other survey questions on the inspiration and collaboration opportunities for future work created by WSFB may provide further insight into the impact of WSFB on Outcome 4.

What about Teachers?



While the teacher survey yielded positive results, the sample size was too small for consideration as part of this evaluation.

Survey results suggest that students were engaged and inspired by WSFB 2019, and that the content was accessible. Teachers also agreed that WSFB made an important contribution/is an important mechanism for STEM engagement and learning.

The results from surveyed teachers may indicate that the engagement of teachers and connection to the National Curriculum could be improved.

Feedback from teachers is vital in assessing the impact made by WSFB on student engagement in STEM. Increasing the engagement of teachers in WSFB and a greater survey response rate would help ensure their responses are reliable for analysis in the future.

“ My students were very engaged by the talk by the scientist [at The Hatchery, QM]. They were able to recall facts, and delighted in nappies for turtles. They recalled types of turtles, foods and specific information ”

- Teacher Survey, WSFB 2019

“ Accessible and inspiring for students ”

- Teacher Survey, WSFB 2019



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