

geekStarter TFC Participant Survey Study

A post-decade analysis re: the impacts of iGEM participation on youth, who were supported by MindFuel through the geekStarter/TFC program, and their post-secondary and career trajectories

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Program alumni dataset provided by: MindFuel Foundation

With thanks to Longitudinal Impact Study Partner: Genome Alberta

With special thanks -- Study made possible through funding provided by ATB Financial

Preliminary Report

Prepared on May 1, 2023

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Foreword

- by Cassy Weber, CEO of the MindFuel Foundation

Canada's Innovation Challenge

The OECD consistently ranks Canada as the most educated country in the world with 56.71% of adults meeting the OECD criteria. In 2020/21, Japan had the second-highest percentage of 51.44%, followed by Israel with 50.92%. The other most educated countries include Korea, United Kingdom, United States, Australia, Finland, Norway, and Luxembourg. However, while Canada consistently ranks as the most educated country globally, it ranked as only 17th overall out of 129, as an innovative country (WIPO, 2020, 2021).

The rankings are based on 80 indicators, grouped into innovation inputs and outputs, which represent the multidimensional facets of innovation. Significantly, Canada ranks only 19th in human capital and research, which focuses on education, tertiary education, and research and development.

While Canada is recognized with several high-ranking inputs, such as institutions, political environment, and government effectiveness, it is offset by the low-ranking inputs in education, tertiary education and research and development. Canada's core weaknesses specific to human capital inputs include low government funding per pupil, low graduate numbers in science and engineering, and low ICT services exports.

Expanding Youth Innovation

The inaugural State of Youth Report (2021) undertaken by Canada reveals significant areas of opportunity, both self-identified by youth and through expert recommendation, including highlighting **Innovation, Skills and Learning** as a **priority area** for **youth investment** and policy. Notable, are the recommendations for investment in entrepreneurship and innovation fellowships, work integrated learning opportunities, and in the development of a skills building strategy.

Moreover, the pandemic has accelerated a shift to digital technologies, platforms, and learning environments that are unlikely to be reversed. Equipping young people with the tools of innovation and skills in this new and emerging environment will give them the foundation they need to succeed, whether as entrepreneurs, innovators, or professionals. Investment in these critical areas lays the foundation for youth across Canada to build an innovation mindset, acquire new skills, and even translate this into economic growth from a young age. The partners in this study believe, based on over 10 years of youth innovation programming, that these investments are critical to building a diversified pipeline of innovation talent. This, as we've demonstrated through impact assessments, results in two critical outcomes:

- 1) increased interest in STEM innovation post-secondary pathways, and
- 2) entrepreneurship in STEM

This study focuses primarily on youth talent development in Alberta over the last 10+ years, however, based on successful programming expansion to Yukon, British Columbia and Ontario, it is clear that this validated youth innovation model adapts to other geographies within Canada. Through continued academic, public agency and private investments, Canada will become a place for innovators to generate growth opportunities. However, we must continue to invest in early-stage development of innovators through programming with various attributes such as youth programs that focus on engaging diversified talent, critical skills training, building mentorship networks, and having access to project funding.

MindFuel, formerly Science Alberta Foundation, a national organization dedicated to youth innovation, has set a critical goal of enabling innovators across Canada to achieve such outputs and recognizes the imperative

nature of preparing our youth innovation talent pipeline for the future. Public agencies and not-for-profits, such as MindFuel and Genome Alberta have been running programming which has made significant investments towards this end. And, for over a decade, the program has invested into high school and post-graduate youth interested in building novel biotechnology products and ideas, taking them to large international audiences through the International Genetically Engineered Machines (iGEM) competition and providing one-of-a-kind training support to setup these youth for success. To date, prior to this study, no longitudinal analysis has focused on gathering comprehensive insights connecting youth skills training, mentor network support, project funding support, under the lens of economic outputs and social progress.

This study will aim to create a thesis for why continued and increased investment in programming such as the Technology Future Challenge and strategic youth innovation supports will be critical to ensuring Alberta, and Canada, continue to increase its innovation capital, bringing economic advantage into the future.

Funding and Partnership Acknowledgments

This study was completed by DCL Consulting on behalf of MindFuel and in partnership with GenomeAlberta. With special thanks to funding provided by ATB Financial.



Executive Summary

Innovation, biotechnology and synthetic biology are commonly running themes of Alberta's International Genetically Engineered Machines (iGEM) competition entrants. This undergraduate synthetic biology-based competition provides student teams with the opportunity to participate on a world stage, learn critical skills and real-world problem-solving opportunities to tackle challenges in producing real-world solutions through biotechnology.

Since 2007, Alberta institutions at the collegiate and high school level have competed in iGEM with great success. Supporting programs such as those offered through MindFuel's Technology Futures Challenge (TFC), known formerly as geekStarter, have been instrumental in preparing students for iGEM and creating pathways for students to engage in entrepreneurial thinking as they produce their technology-based solutions. With over 76 projects and >750 students who have participated in this almost 15-year period of competition seasons, there has been no formal longitudinal analysis of the iGEM impact on youth post-secondary pursuits and career trajectory.

This study aims to gain insights into critical program elements that have contributed to youth innovation in the short term, and, how these program elements have impacted academic pursuits and careers. These findings help to develop meaningful frameworks, such as geekStarter/TFC, that support youth to make critical impacts to Alberta's innovation ecosystem, not only the biotechnology space but beyond.

Overall, 757 students were identified as being part of 76 projects from 2007-2022 of which 440 contact records were created and 162 survey respondents were reached through various digital means. Participants ranged from a wide background and 96% of all Alberta iGEM teams were represented amongst the findings. The survey methodology probed into the specific attributes of the iGEM experience, finding that students were driven into the opportunity through a variety of reasons and left with an overwhelming positive experience that made an impact on their future careers.

Study participants identified key learnings such as "walking away with valuable skills in team management, communication, and critical thinking development" that were applied in various ways in their future endeavors. This experience had a marked impact on the academic journey of these students with many receiving a significant number of scholarship awards including high level national and international level achievements.

This springboard into syn-bio innovation helped students better prepare for careers, noting that about 40% of participants continue to use molecular biology skills in their current roles and these participants largely maintain careers in technology, academia, health care and education. These respondents also saw their biotechnology skills used to become problem solvers and innovators throughout iGEM and into their careers. Two in three respondents reported being part of a team that has created an innovation in their careers demonstrating that these achievers in the iGEM competition have continued on to drive real-world impacts through their various pursuits. Along with being entrepreneurs and technologists, a large number of respondents (>20%) had started companies speaking to the innovative mindset created through the program. Additionally, though a tangential finding in this study, it is noted as a critical finding that minimal "brain-drain" from Canada occurred among the program alumni, with the majority of participants (79%) currently still located in Alberta. Approximately 21% of Alberta based iGEM respondents are located in locations other than Alberta, including BC, ON, the USA, or internationally (ITNL) with the most common locations being in Europe (Netherlands in particular).

Overall, the results of the study indicate a positive impact in the short term and long term for students who are mentored in innovation, have access to skills learning and training, and who are challenged to ideate through problem solving. These youth indicate they are "better prepared" for careers in critical thinking, innovation and new technology creation. The iGEM competition and supports thereof is an exemplar of an innovation program priming student minds to make an impact in a growing competitive and technology-driven world. Further work can expand on the specifics of these learnings through direct interviews and reports for this dataset.

Survey Metrics

Total number of iGEM project entries: There have been **76 unique projects** from Alberta based teams from 2008-2022. We received participation from 73 (**96%**) of all student projects from Alberta teams since 2008.

Total number of participants in iGEM: **757 individual students/advisors/instructors** have participated in iGEM teams as referenced by iGEM records.

Total number of individual participants identified through social media, connections and records: **519 individuals** were identified throughout the project.

Total number of reach outs verified via email and social media outreach: Of these individuals approximately **440 contact records** had direct reach outs via LinkedIn, email and other social media.

Participant Survey Response: Of these 440 contacts, the final survey included **162 student, advisor and instructor** responses with an estimated completion rate of ~36%.

Students, Advisors, Instructors Breakdown: Because many participants in iGEM started as students and then became advisors/leaders of teams in the future it is difficult to fully quantify the number of individual student responses. Instructors were given the opportunity to participate in the survey and represented less than 5% of the respondent list.

The survey results have been segmented into three core sections:

- Demographics of iGEM Participants
- The Impact of the iGEM Experience
- Participant Career Journey and Innovation Involvement

Survey Methodology

Participants were targeted from 2008 - 2022 iGEM teams who were contacted to participate in the survey through email and social media reach outs. All intake occurred through the same SurveyMonkey link and only survey respondent data to which participants agreed to opt into consent documentation was included.

The data represented in this survey was used to make inferences regarding the composition, view points and choices made by iGEM alumni. Since this only represents a fraction of the entire community the viewpoints held by these individuals may differ from those that had not participated in the survey. Wherever possible, this report will aim to provide specific areas of potential bias and future discussion on next steps with this research.

Respondents were asked a series of questions that varied in terms of multiple choice, rating questions on a 5 point scale, or open ended questions based on the question asked. Data was either extracted directly from the population of responses or in the case of qualitative data, individual responses were analyzed

and tagged based on form of response. Individual responses are available upon request for further analysis on a question-by-questions basis. Some attempts at reducing bias in this report included:

- Using broadly reaching social media campaign strategy
- Standardized email language for all email reach outs
- Financial incentivization for those who participated

Given that individuals were provided with an opt-in opportunity through connection with social media or email, potential sources of bias for this work include:

- Respondents may have been more likely to respond if they had a positive experience with iGEM
- Respondents who are not using LinkedIn or other sources of easily accessible social media because of their career position or other personal choices, may be more likely to be excluded from the dataset.
- Respondents may have been more likely to respond to the survey if they saw value in programs or continue to participate in the program
- Geographical or locational bias could exist to make it easier to connect with group members

Overall we examined bias from the perspective of the demographics of the individuals and representation of viewpoints across various teams in the competition.

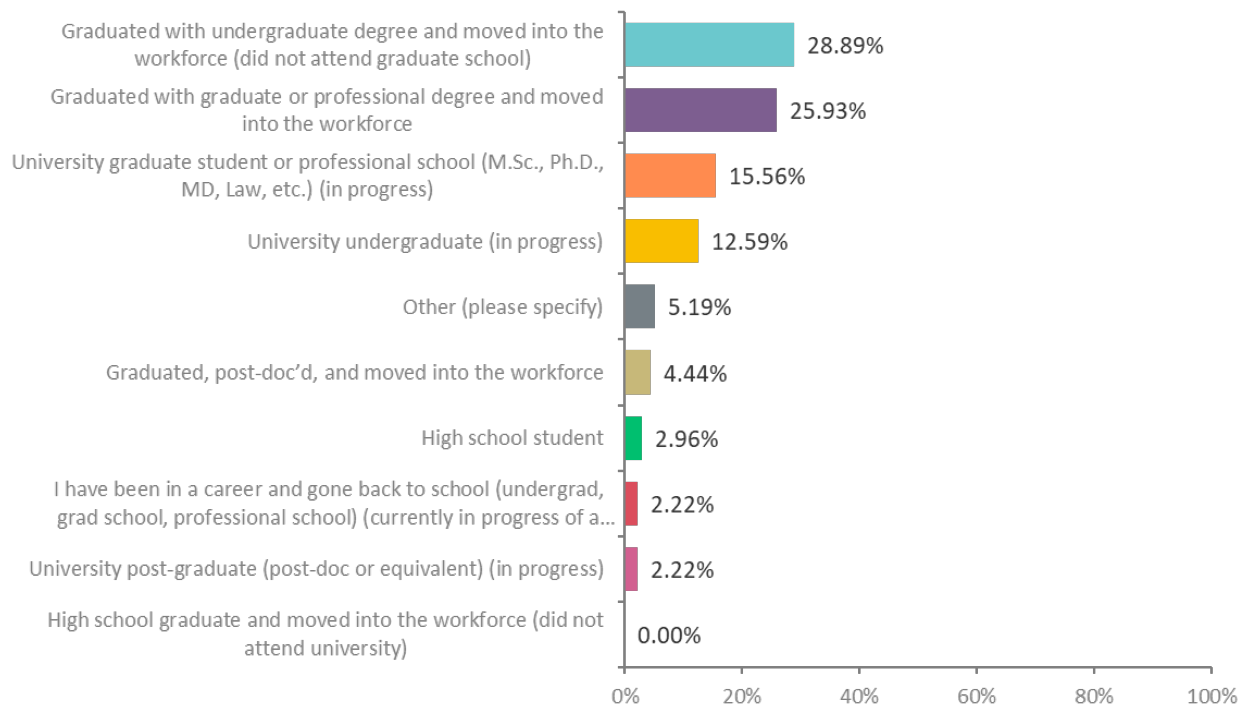
Participant Demographics

Summary of Findings:

- **iGEMer Diversity** -> Respondents come from diverse backgrounds based on their race, sexual orientation and are close to achieving gender parity
- **iGEMers Work in Technology** -> Most iGEM respondents now work in the technology sector, followed by academia, education and health care.
- **iGEMers have Mainly Stayed in Alberta** -> While several individuals have left most are still based in Alberta.
- **Close to Half of iGEMers Have Continued to use their molecular biology skills** -> About 40% continue to use their skills in their current role.

Baselining Current Status of iGEM Students

Most iGEM responses come from students who have moved into the workforce or are in/completed a professional program. A smaller percentage of iGEM respondents come from those actively pursuing their educational qualifications.



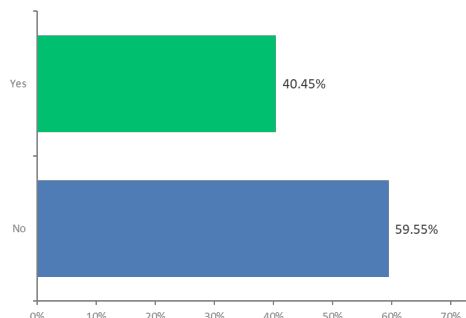
Current Professions and Jobs Of iGEM Alumni

The study aimed to understand the current professions and jobs of iGEM alumni. Most common responses for job professions include keywords such as software, engineer, research, manager and coordinator. Several of the individuals include educators, researchers, and founders of companies. **The most common industries that participants now work in include Technology and software development. Other responses included:**

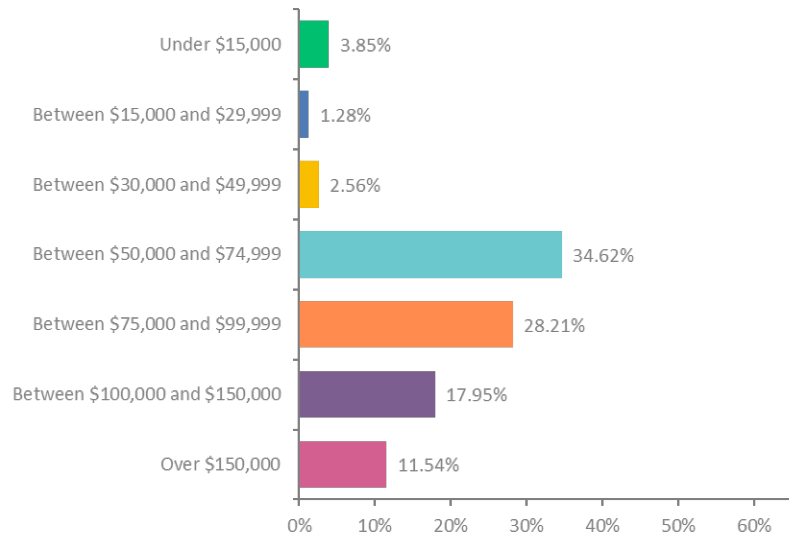
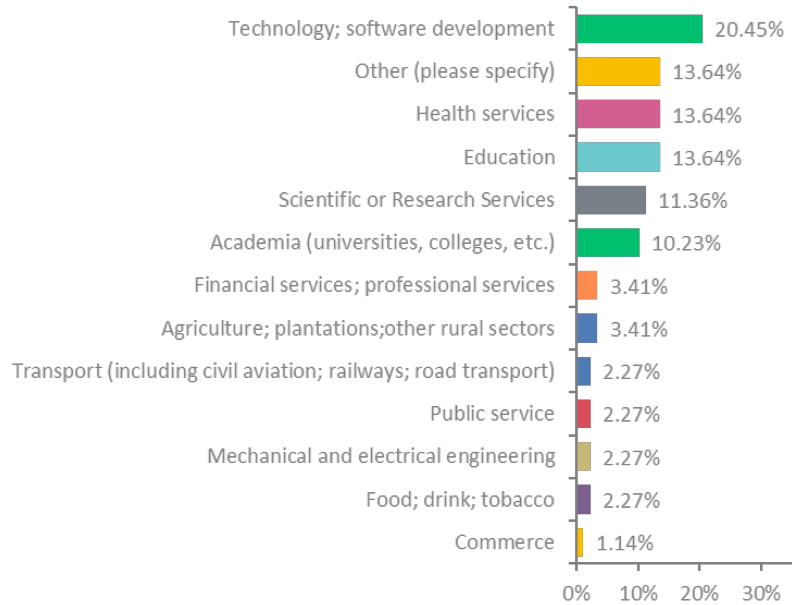
- Pharmaceutical and Industrial Services
- Environmental and Industrial Services
- Biotechnology Sector
- Investments & Consulting
- Non-profit organization

Financially, 92% of respondents making an annual salary of \$50,000 or greater, with over 50% of respondents making between \$50,000-\$99,999 which can be considered above average for median data available from Alberta and Canadian sectors

Molecular Biology Skills



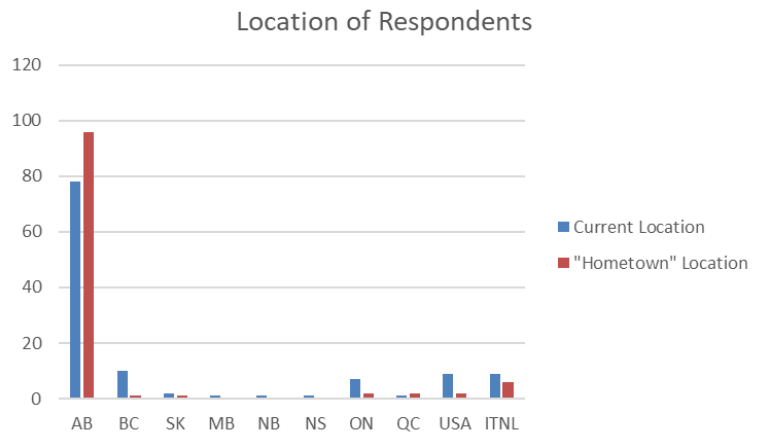
Laboratory Research Associate Medical Consultant Senior Assistant Teacher Engineer
 Instructor Operations **Software Engineer**
 Scientist Research Coordinator Manager Specialist
 Software Developer High School science



~40% of iGEM respondents continue to use molecular biology and -omics skills in their day to day job. Representing the retention of these iGEM skills in likely innovation based fields

Location and Retention

Alberta has experienced what has become known as “brain drain” for our STEM based professionals and was an aim to be investigated in this study. From the responses, the majority of participants in the program are currently still located in Alberta. Approximately 21% of Alberta based iGEM respondents are located in locations other than Alberta. Specifically these individuals tend to be found in BC, ON, the USA, or internationally (ITNL) with the most common locations being in Europe (Netherlands in particular).

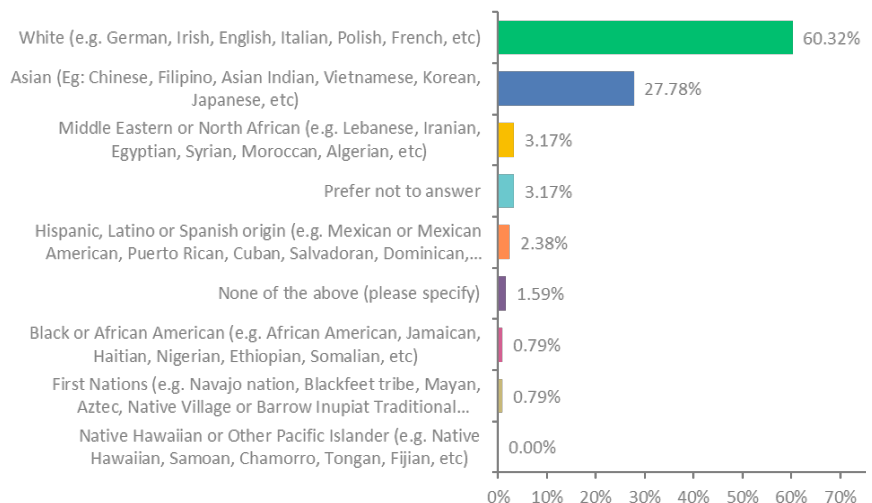


Compared to other studies that have highlighted that Canadian STEM graduates in software engineering and various other technology disciplines have moved to locations like the USA, in numbers as high as 30%, it is important to highlight that most respondents remained in Canada (9% moved to USA/ITNL location as their current location) and 79% remain in Alberta specifically. Sources such as [“Reversing the Brain Drain: Where is Canadian STEM Talent Going?”](#) have highlighted this key finding as well as numerous other organizations such as [Digital Alberta](#). Industry organizations such as BioAlberta also highlight the critical need of having a highly diversified workforce in the biotechnology industry with an anticipated need to increase in hiring per their [2021 State of the Industry Report](#).

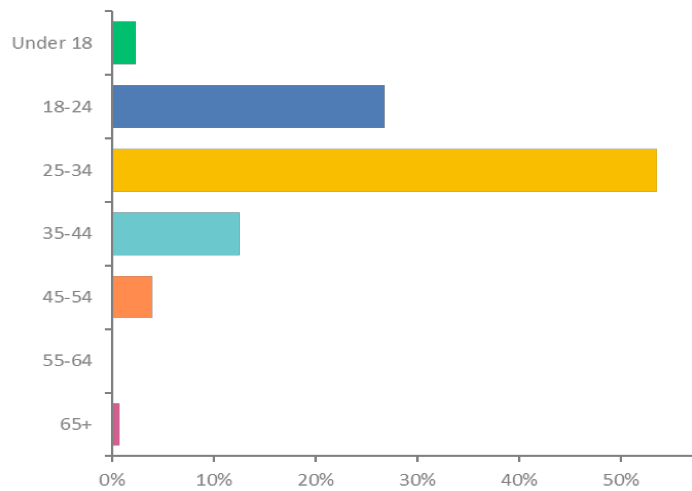
Demographic Background Information

In addition to the current state and location of participants in the program, questions were also asked about the demographics of the respondents.

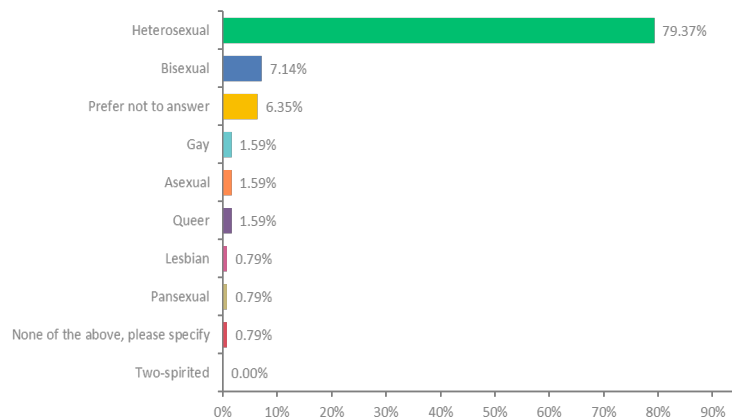
When asked about the respondent’s Racial Background, close to 40% of respondents were of a different racial background than “White”. This is important for the purposes of identifying diversity amongst those who have participated in the iGEM competition and how to move forward with continued involvement in the future.



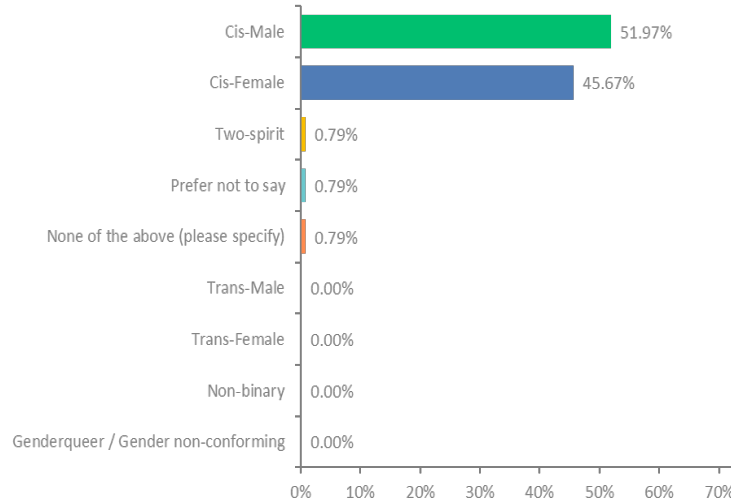
When asked about the current age of participants in the program, the vast majority of those respondents were between the age of 25-34. As is represented later in the dataset most high school and undergraduate respondents were from 2014-2016 which would make them in line with the anticipated age of those within their first 5 - 10 years of their career. Other participants who are older in the study may represent instructors or advisors to the program.



The Sexual Orientation was an optional question asked of the participants to which approximately 79% identified as Heterosexual and ~14% of respondents identified as LGBTQA+. The next most common being Bisexual .



Finally, the gender of respondents was analyzed along various factors and the respondents were generally close to 50% between the participant groups. The breakdown and specific characteristics of gender are analyzed later in this document.



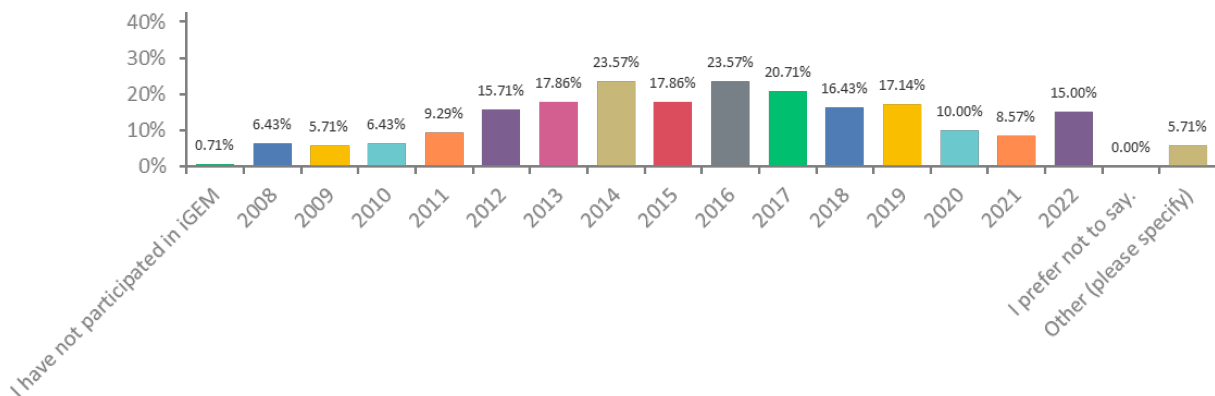
The iGEM Experience

Summary of Findings:

- **iGEMers remember their experience well** -> 95% of iGEMers remember their experience
- **iGEMers largely joined iGEM because of their desire for learning more about synthetic biology** -> many also cited their interest in community building, skill development and fun.
- **iGEMers largely valued their team interaction as being most impactful** -> Respondents also mentioned the value of the competition itself and mentorship from advisors.
- **iGEMers saw geekStarter as a key part of positively impacting their iGEM experience** -> iGEM positively supported respondent’s careers and geekStarter made an impact on these students.
- **Many iGEM students continued their projects after the competition** -> over 20% of all iGEM students talk about continuing a project for at least 1 year after the competition
- **iGEMers are Innovators**-> many respondents note a high degree of participation in innovation (22% consider themselves entrepreneurs) and company creation (20% have started a company)

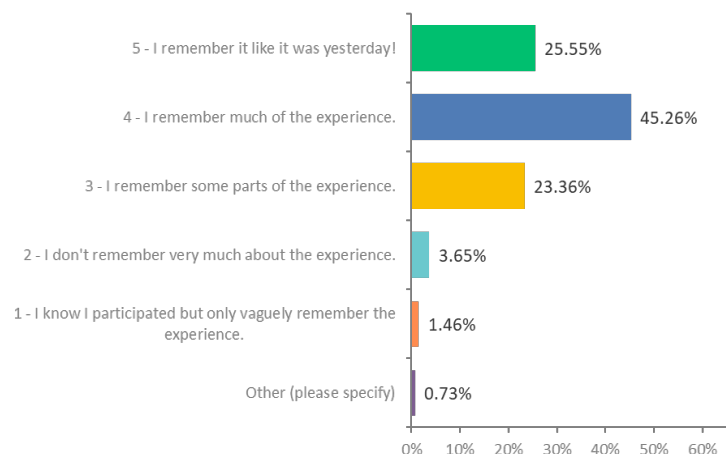
iGEM Team Participation

Total team response rate was 96%. We had participation from virtually every iGEM team that has ever participated. The only teams that did not have a representative were: Alberta_NINT 2008; Alberta-North-RBI 2012; UrbanTundra_Edmonton 2017.



Most iGEM respondents participated between 2013 - 2017 but all years have been represented. **Note that some of the “Other” category participants noted that they were from 2007 teams.**

Most respondents remember their iGEM experience well >95% of respondents range from part of the experience to very well.



Pre-iGEM Involvement - Why Get Involved?

Respondents have a variety of reasons to want to get involved with iGEM. However, the bulk of the reasons centered around:

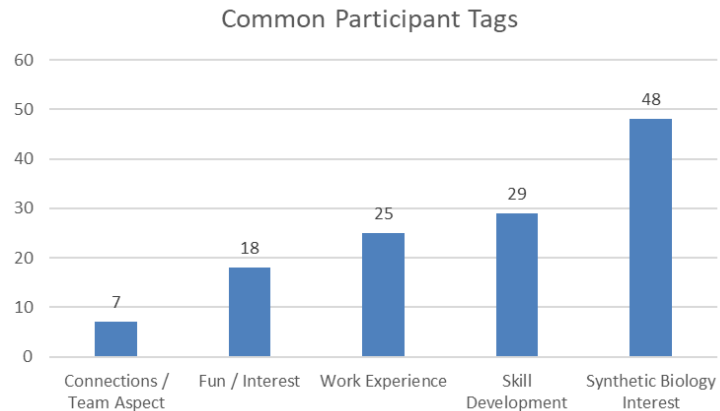
Connections / Team Aspect - An opportunity to build connections or participate in group based opportunities

Fun / Interest - Participating because of passion, for example, the competition seeing “fun” the ability to travel for the competition, or to be involved in a group community member opportunity.

Work Experience - The ability to gain relevant experience in a field or area that they are interested in for future career or academic opportunities.

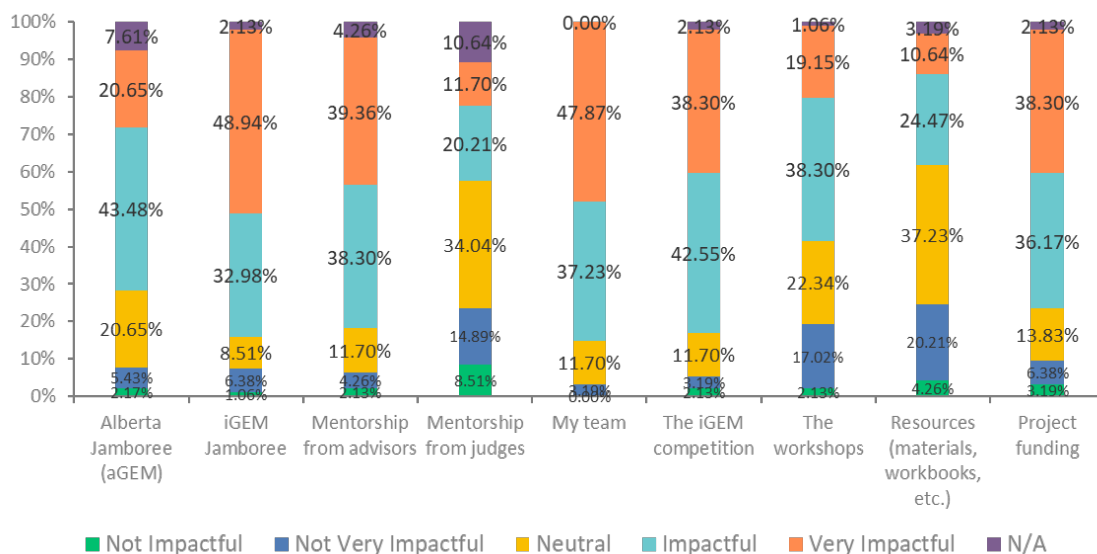
Skill Development - An opportunity to develop and build skills particularly centered around lab or skill based functions.

Synthetic Biology Interest - A strong interest or desire to participate in molecular biology and/or synthetic biology as the driving force to be involved.



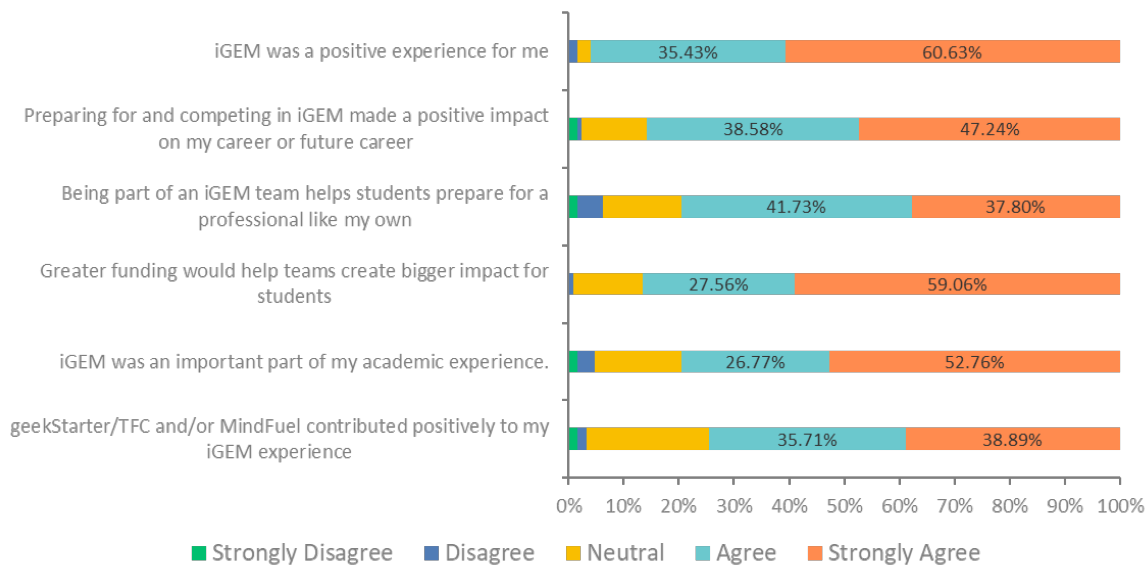
During iGEM - What Supports Helped Drive Student Outcomes?

Most students participated in a geekStarter workshop - about 68% of all respondents participated in a MindFuel based event. When asked what the most impactful part of the iGEM experience was, students noted the following:



Ranking of important criteria (based on those rated collectively as either Impactful or Very Impactful):

- My Team (85%)
- iGEM Jamboree (81%)
- iGEM Competition (80%)
- Mentorship from advisors (78%)
- Project Funding (74%)
- Alberta Jamboree (64%)
- The workshops (57%)
- Resources (35%)
- Mentorship from Judges (32%)



Overwhelmingly, iGEM respondents saw the competition as a positive experience for them personally (>96% of respondents agreed or strongly agreed) and that iGEM made a positive impact on their future career. Overall iGEMers agreed that being part of an iGEM team helped students prepare for a profession similar to their own (>79%). **A significant number of respondents identified that MindFuel and the geekStarter program positively impacted their iGEM experience.**

When students were further probed on how geekStarter supported their experience was strongly impacted by the programming geekStarter put on. Many note the community, the workshop training and the experiences at aGEM as invaluable contributions towards their development.

Post-iGEM - Team and iGEMer Outcomes

For many students iGEM wasn't just a stopping point but continued on for much continued work. ~20% of all respondents continued past their single year iGEM competition team. Many mentioned independent studies, furthering a graduate degree project or pursuit as a company. When asked, 10% of respondents

have commercialized their technology, 5% filed trademarks and 11% pursued some form of patent protection.

Question (Have you been involved with any of the following; either in your career or as a direct result of an iGEM project you were part of?)	Yes - With An iGEM Project (% - # of respondents)
Commercialization of Technology (new product or service)	10.37% - 14
Trademark Registration	5.34% - 7
Patent Filing	11.19% - 15
Publication in a Peer Reviewed Journal	25.93% - 35
Start a company	8.27% - 11

Post-iGEM - Did iGEM Support Careers?

Respondents had a wide variety of responses to how iGEM impacted their future career, however, there were some consistent themes throughout these responses particularly surrounding:

- **Skill Building** - Opportunities to learn new skills translated into their career whether technical or other. Many spoke about the skills in team building, networking and presentation as invaluable.
- **Inspiring a Career** - Several respondents talked about how their time at iGEM inspired their future direction in synthetic biology or research. Some talked about using their iGEM experience as a springboard to start a company.
- **Career Change** - Even some who saw iGEM as a less than ideal career opportunity talked about how the experience helped them to better understand a new career path in a different area.

Only 12 out of 81 responses (14%) spoke about iGEM not having some type of impact on their career experiences and several of these were more as a result of shifting to a new career path which did not involve synthetic biology.

iGEM respondents have been heavily involved in commercialization of technologies in various industries whether in synthetic biology or in other verticals. An estimated 40% of respondents went on to publish some type of peer reviewed publication and over 25% were involved in the commercialization of a technology.

Question (Have you been involved with any of the following; either in your career or as a direct result of an iGEM project you were part of?)	Yes - In My Career
Commercialization of Technology (new product or service)	25.93% - 35
Trademark Registration	8.40% - 11
Patent Filing	13.43% - 18
Publication in a Peer Reviewed Journal	39.26% - 53
Start a company	13.53% - 18

This combined with those who also had the same outcomes with iGEM showed that:

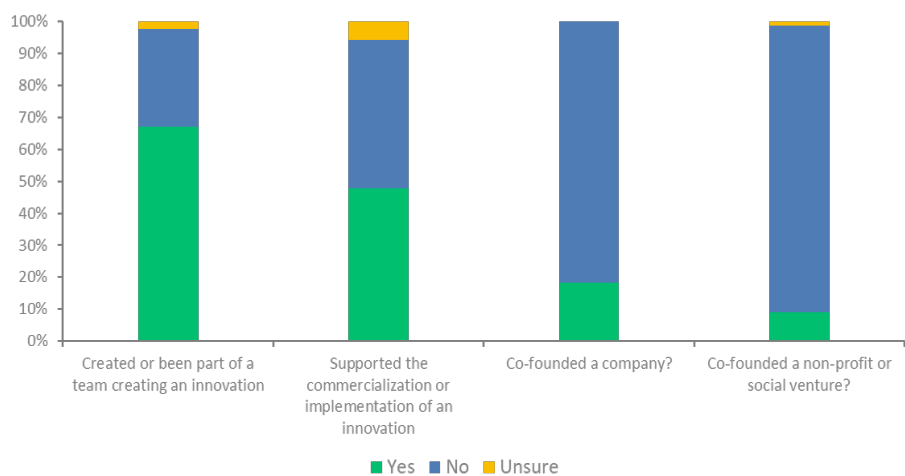
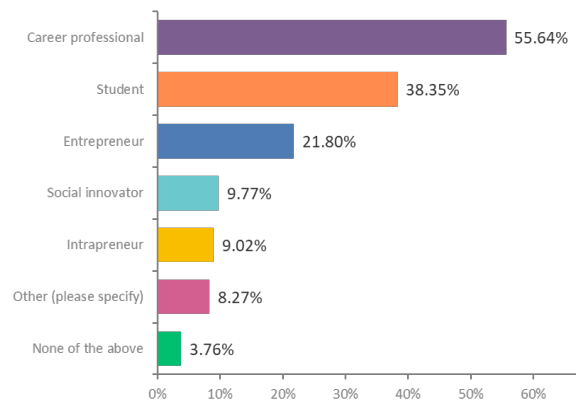
>20% of respondents have started a company.

>64% are authors in peer reviewed journals

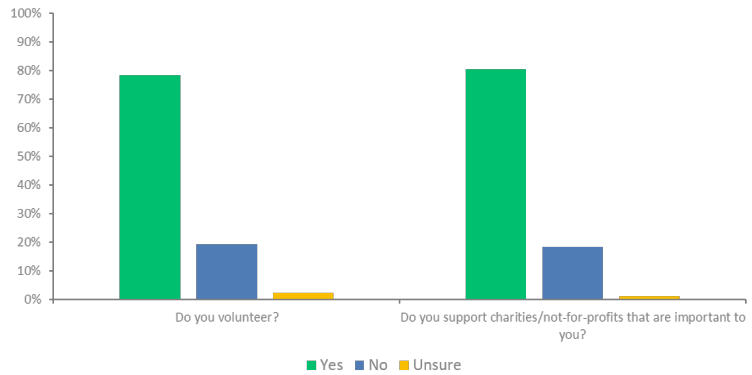
>36% have commercialized a technology

When asked what respondents consider themselves to be and if they chose to identify with any of the following labels, 21% of the respondents consider themselves to be

entrepreneurial and 30% are both entrepreneurial and intrapreneurial. Other answers included: Scientist and Educator most commonly. When asked if they have supported building an innovation or commercial product, the **majority of respondents (67%)** have been part of a time creating an innovation, and 18% of respondents have co-founded a company

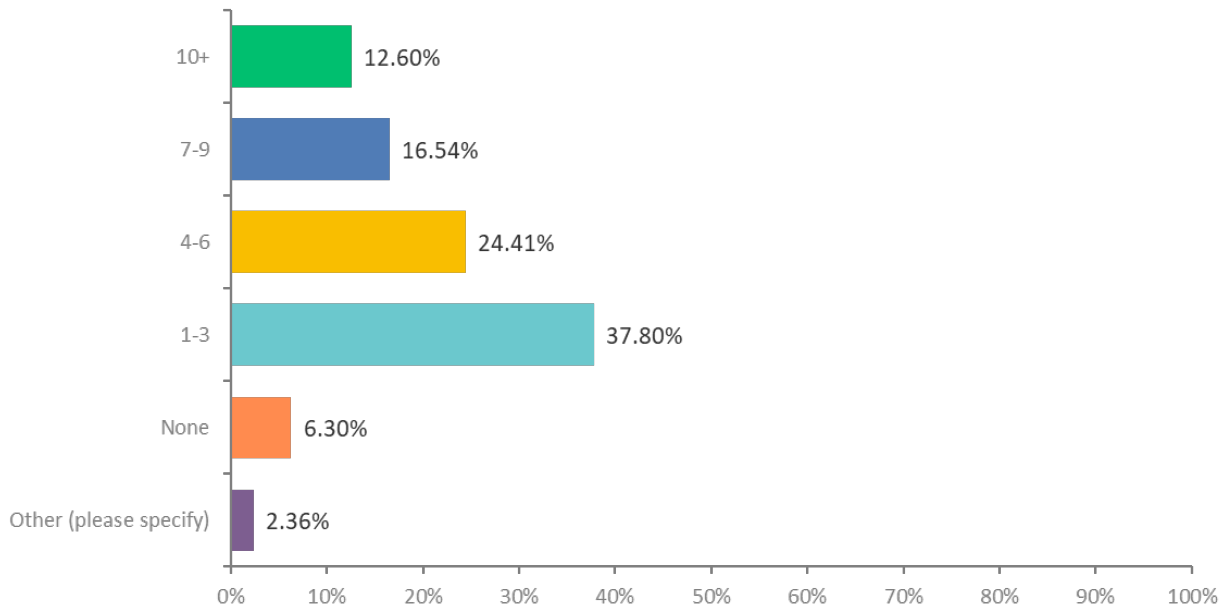


When asked if the respondents supported charities or volunteered, 78% of respondents volunteer and 80% support charities that are important to them.



Post-iGEM - Did iGEM Support Academic Success?

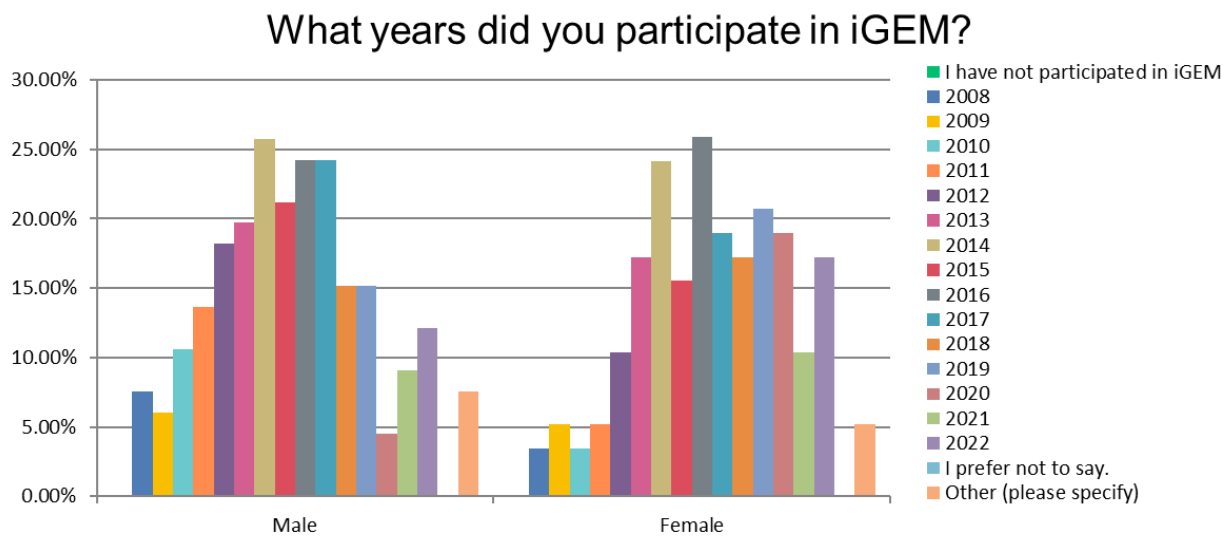
iGEM had a significant impact on respondents ability to succeed scholastically, throughout the survey respondents discussed the impact the support had on their skill building opportunities. In addition, it provided publication opportunities along with scholarships. Respondents were well awarded with scholarships. Almost all iGEMers had received some form of scholarship and over half of the respondents had received a minimum of 4 scholarships.



Gender Analysis

Overall 52% of the respondents to the survey were male and 46% respondents denoted they were female. The data was analyzed based on these two groupings and compared the following were the highlighted differences in responses noted throughout the survey. Note that a “difference” is denoted as a 10% or more difference in answer to the particular question and the statistical relevance of which may vary question to question based on the analysis. Those that followed the same trending pattern or were considered less than this number were excluded from the below.

iGEM Participation



A higher percentage of those respondents who considered themselves male participated in earlier teams in iGEM while female respondents tended to be from newer teams (2018-2022). This may have an impact on responses since newer participants may be less likely to have had time to develop skills or further their career pathway. When asked about mentorship from advisors and judges respectively, male respondents rated the importance as impactful or very impactful 67% and 19% of the time while female respondents

noted this 78% and 31% of the time. This may suggest that mentorship has a more dramatic impact on female participants in the iGEM competition.

Technology Innovation and Commercialization

In general female respondents had a lower number of involvements in commercialization of a technology (22%) versus those who identified as male (48%). This was also true for those individuals who started a company (12% female vs 31% male) and patent filings (15% female vs 34% male). Interestingly, this trend was not the same for publications in peer reviewed journals and much lower for trademark registration.

In addition, fewer female respondents started companies (4 vs 12 respondents), been part of a team for creating an innovation or implementing said innovation. It is well known and understood that female involvement in the start-up ecosystem and innovation industry are underrepresented versus male participation. This may suggest that the career choices chosen by those individuals involve more innovation based activities whereas females choose activities that involve other forms of activities including research and active publication for development.

The choice of career based on the gender analysis (see question analysis below) may also suggest that those who identified as female in the survey may be choosing career pathways that require less innovation

Commercialization of Technology (new product or service)						
	YES - WITH THE IGEN PROJECT	YES - WITH MY CAREER OR SCHOOL ACTIVITIES	NO	N/A	TOTAL	
Q30: Cis-Male	12.86% 9	35.71% 25	50.00% 35	1.43% 1	56.91% 70	
Q30: Cis-Female	6.67% 4	15.00% 9	75.00% 45	3.33% 2	48.78% 60	
Trademark Registration						
	YES - WITH THE IGEN PROJECT	YES - WITH MY CAREER OR SCHOOL ACTIVITIES	NO	N/A	TOTAL	
Q30: Cis-Male	4.84% 3	11.29% 7	82.26% 51	1.61% 1	50.41% 62	
Q30: Cis-Female	6.78% 4	6.78% 4	83.05% 49	3.39% 2	47.97% 59	
Patent Filing						
	YES - WITH THE IGEN PROJECT	YES - WITH MY CAREER OR SCHOOL ACTIVITIES	NO	N/A	TOTAL	
Q30: Cis-Male	13.43% 9	20.90% 14	64.18% 43	1.49% 1	54.47% 67	
Q30: Cis-Female	10.00% 6	5.00% 3	81.67% 49	3.33% 2	48.78% 60	
Publication in a Peer Reviewed Journal						
	YES - WITH THE IGEN PROJECT	YES - WITH MY CAREER OR SCHOOL ACTIVITIES	NO	N/A	TOTAL	
Q30: Cis-Male	23.61% 17	34.72% 25	40.28% 29	1.39% 1	58.54% 72	
Q30: Cis-Female	25.76% 17	34.85% 23	37.88% 25	1.52% 1	53.66% 66	
Start a company						
	YES - WITH THE IGEN PROJECT	YES - WITH MY CAREER OR SCHOOL ACTIVITIES	NO	N/A	TOTAL	
Q30: Cis-Male	10.77% 7	20.00% 13	67.69% 44	1.54% 1	52.85% 65	
Q30: Cis-Female	3.45% 2	8.62% 5	86.21% 50	1.72% 1	47.15% 58	
Q30: Cis-Female	12.07% 7				12	
Other (please describe)		1		0	1	

Mentorship from advisors		
	NOT IMPACTFUL	NOT VI IMPAC
Q30: Cis-Male	4.55% 3	6
Q30: Cis-Female	3.45% 2	1
Mentorship from judges		
	NOT IMPACTFUL	NOT VI IMPAC
Q30: Cis-Male	7.58% 5	19
Q30: Cis-Female	12.07% 7	12

as a core skill set in their day to day ability to execute in that role (for example education versus software technology) which may also account for this difference.

Created or been part of a team creating an innovation				
	YES	NO	UNSURE	TOTAL
Q30: Cis-Male	77.55% 38	18.37% 9	4.08% 2	57.65% 49
Q30: Cis-Female	52.78% 19	47.22% 17	0.00% 0	42.35% 36
Supported the commercialization or implementation of an innovation				
	YES	NO	UNSURE	TOTAL
Q30: Cis-Male	59.18% 29	34.69% 17	6.12% 3	57.65% 49
Q30: Cis-Female	33.33% 12	61.11% 22	5.56% 2	42.35% 36
Co-founded a company?				
	YES	NO	UNSURE	TOTAL
Q30: Cis-Male	24.49% 12	75.51% 37	0.00% 0	57.65% 49
Q30: Cis-Female	11.11% 4	88.89% 32	0.00% 0	42.35% 36
Co-founded a non-profit or social venture?				
	YES	NO	UNSURE	TOTAL
Q30: Cis-Male	10.20% 5	87.76% 43	2.04% 1	57.65% 49
Q30: Cis-Female	8.33% 3	91.67% 33	0.00% 0	42.35% 36

	NONE OF THE ABOVE	ENTREPRENEUR	INTRAPRENEUR	SOCIAL INNOVATOR	STUDENT	CAREER PROFESSIONAL	OTHER (PLEASE SPECIFY)	TOTAL
Q30: Cis-Male	0.00% 0	34.85% 23	10.61% 7	7.58% 5	33.33% 22	60.61% 40	9.09% 6	83.06% 103
Q30: Cis-Female	6.90% 4	10.34% 6	8.62% 5	12.07% 7	44.83% 26	48.28% 28	8.62% 5	65.32% 81
Total Respondents	4	29	12	12	48	68	11	124

Female respondents also noted themselves as entrepreneurs fewer times than male respondents. 35% of male respondents identified as entrepreneurs while only 10% of female respondents identified as entrepreneurs. There were more students and fewer career professional respondents in the female grouping likely because female respondents tended to be younger and newer iGEM teams.

Career Progression

When the careers of male versus female students were compared most industries were represented in equal proportion. Two particular industries stood out for differences. Male respondents were largely represented in technology while female respondents were largely represented in education.

	Education	Technology; Software Development
Male	8%	27%
Female	23%	9%

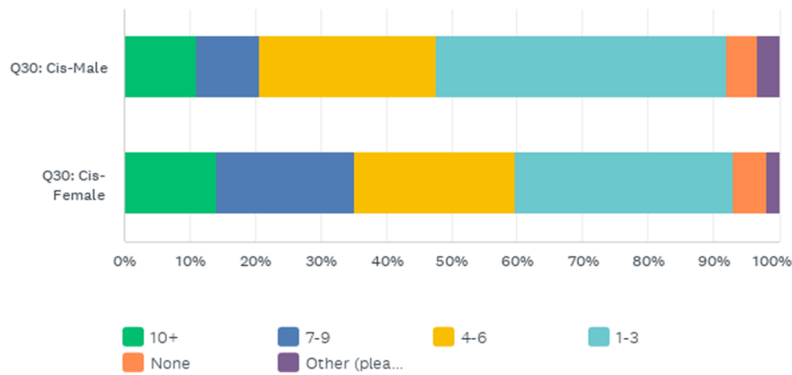
On average in comparing the salary of male and female respondents, some differences were noted. Most female respondents tended to make less than their male counterparts. It is important to consider the stage of each these conversations, since there was an increase in female participation in the program over

time and there was a higher degree of student respondents in the female population it is possible this is due to less time for these individuals to be actively working in careers and develop skill sets. (i.e. these represented individuals who may still be students or working through academic pursuits).

	UNDER \$15,000	BETWEEN \$15,000 AND \$29,999	BETWEEN \$30,000 AND \$49,999	BETWEEN \$50,000 AND \$74,999	BETWEEN \$75,000 AND \$99,999	BETWEEN \$100,000 AND \$150,000	OVER \$150,000	TOTAL
Q30: Cis-Male	14.06% 9	7.81% 5	6.25% 4	34.38% 22	14.06% 9	15.63% 10	7.81% 5	52.89% 64
Q30: Cis-Female	28.07% 16	3.51% 2	12.28% 7	17.54% 10	24.56% 14	8.77% 5	5.26% 3	47.11% 57
Total Respondents	25	7	11	32	23	15	8	121

Scholarships and Academic Pursuits

Graduate degrees were more common amongst female respondents. 35% of male participants entered graduate school (MSc / PhD) and either transitioned into higher studies, professional schools or a career while this group encompassed 48% of female respondents. This was particularly interesting as the female students tended to be younger than the male respondents.



Female respondents also received a **high number of scholarships** and noted a slightly higher agreement that Mindfuel and TFC helped them in receiving these scholarships (50% versus 42% for male respondents). Almost 60% of female respondents received 4+ scholarships versus 47% of male respondents.

Summary

Overall female respondents were younger participants in iGEM who were more research, education and academically oriented versus male respondents to the survey. While there was less female involvement in innovation and commercialization activities these respondents tended to be higher in academic and scholastic achievement focusing on education and graduate studies as careers. These differences may reflect unique career pathways between the two genders.

Conclusions and Next Steps

Overall this study is a preliminary working document that highlights the importance of measuring the impacts that have been generated through funding and outcomes of the iGEM and geekStarter/TFC program across participants in Alberta. It is clear that participation in this international competition in synthetic biology helped blaze a path forward for numerous innovators and entrepreneurs within the innovation landscape. This diverse group of individuals have gone on to enter Alberta's technology ecosystem with others entering into health care, academia and other supporting roles. With the vast majority of these participants agreeing that not only was iGEM a positive experience towards their career goals but also that support programs by MindFuel and others were critical in achieving success, investments into programs like geekStarter have had a profoundly positive impact on our communities.

This initial study lays the foundation for numerous other elements of investigation with existing and future datasets. Since these only represent the preliminary findings of the study, future participation will include analysis on the commercial, innovation, academic and social benefits of the program along with understanding the financial benefits to the community, province and even country in funding these types of opportunities and programs.

Clearly, iGEM has created a one-of-a-kind ecosystem for youth innovators in the province of Alberta and will continue to create impacts towards building a sustainable and growth-oriented community of innovation.