

Fostering Community and Confidence for Women in STEM

CSC318H1: The Design of Interactive Computational Media

Chyna Hui

chyna.hui@mail.utoronto.ca

Cindy Ly

cindykim.ly@mail.utoronto.ca

Lucy Ma

lucyxinyu.ma@mail.utoronto.ca

Maggie Chen

maggiemc.chen@mail.utoronto.ca

Umayrah Chonee

umayrah.chonee@mail.utoronto.ca

Tina Zhang

yizhoutina.zhang@mail.utoronto.ca

TA: Brenna Li

Group: Pixelateers

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General Problem

The science, technology, engineering, and mathematics (STEM) field is a driving force for innovation and economic growth. As a result, there is an increasing demand for STEM-based skills within the labour market. In turn, those who work within the STEM field will be met with many benefits, including higher wages, lower unemployment rates, and increased job opportunities. However, studies over time have consistently shown that women are still widely underrepresented in STEM education programs and in the labour market. A report released by the National Coalition for Women and Girls in Education states, “the gender gap that exists in the STEM workforce cannot be blamed on differences in academic preparation” as women are equal to men in terms of capability in science and mathematics (McDermott-Murphy, 2022). However, external factors, such as “lack of role models, cultures that tend to exclude women, and persistent stereotypes about women’s intellectual abilities” all contribute to this gender gap (AAUW, n.d). The STEM disparity is just another indicator of the systemic sexism that still exists within our culture, therefore, it would be impossible to come up with a solution that solves these issues. Instead, our goal is to provide a solution that will *support* women who are entering the STEM industry by providing them with an inclusive and safe space to reach out for support and encouragement.

According to Statistics Canada, 34% of STEM bachelor’s degree holders are women, yet they only make up 23% of Canadians working in science and technology (Wall, 2019). Additionally, findings also indicated that male STEM graduates were more likely than female STEM graduates to be employed in a STEM occupation (Frank, 2019). Therefore, women have a more difficult time breaking into the industry than men, further perpetuating the gender gap. We understand how crucial STEM exposure is during adolescence in influencing young girls’ decision to choose STEM, as over time this will increase the overall participation of women in STEM. However, our scope is to help young student women who

have already chosen STEM as their career path because in reality, women who choose the STEM field still face a multitude of challenges while navigating their careers. The STEM field is highly-male dominated, evidently, work culture tends to be inflexible, exclusionary, and unsupportive or unattractive to women and especially, women of colour (AAUW, n.d.). As a result, women who enter these spaces are more likely to experience imposter syndrome, lower self-confidence which can result in self-handicapping behaviours (Crawford, 2021). Additionally, the fewer numbers of women in STEM fields directly results in less role models of which other women can *identify with*. According to Bandura's social cognitive theory, having a relatable role model succeed in a similar task is a key source to self-efficacy; "one's perceived ability to learn and do well in a domain." (Gladstone & Cimpian, 2021). Therefore, creating spaces for women to form personal connections with individuals of whom they identify, and share common goals or background with can be significant in instilling confidence in women who wish to pursue STEM careers.

Stakeholders

Primary

Our primary stakeholders are university students that are studying STEM. These are individuals that are looking ahead at their future and anticipate either entering the STEM workforce or further pursuing academia.

Secondary

Our secondary stakeholders are women-identifying STEM professionals who are well-established in the industry or academia. They are extremely knowledgeable in their field and have plenty of experience in career navigation.

Tertiary

Our tertiary stakeholders are professionals in the STEM industry who have significant influence and say in who can enter these STEM spaces. They could also have an impact on a space's inclusivity and culture. This can include tech recruiters, professors, hiring directors, and DEI (diversity, equity, inclusion) employees.

Persona



"I see the lack of representation and I'm proud to be pursuing STEM as a woman, but I think there is also a constant pressure to prove your worth."

AGE	21
OCCUPATION	Student
GENDER	Woman
LOCATION	Toronto, ON

HARDWORKING **CURIOUS**
EMPATHETIC **PASSIONATE**

Sophia the STEM student

ABOUT

Sophia is a University of Toronto student in her fourth year of undergrad studying computer science. She was born and raised in Toronto, Canada after her parents immigrated from Malaysia. As she prepares to graduate soon, she is beginning to look for full time job positions within the tech industry. She has always been passionate about software development and has worked very hard to achieve her goals.

GOALS

- Obtain a software developer position at the tech company of her choice
- Develop personal connections with STEM professionals she looks up to and learn about their career paths
- Become more confident in her skills and ability to succeed in her job

PAIN POINTS

- She is often one of the few women in her classes and knows there is a lack of female representation within STEM
- Doesn't feel heard in male-dominated spaces and is often left out or underestimated
- Suffers from imposter syndrome which is perpetuated by the gender gap in STEM

NEEDS

- Access to resources that provide opportunities for networking, knowledge transfer, and career guidance
- A safe space to be surrounded by like-minded individuals of whom she can relate and identify with

PERSONALITY

Introvert	Extrovert
Analytical	Creative
Busy	Time rich
Messy	Organized
Independent	Team player

Field Studies

Questionnaire

Questionnaires were selected as the first data-gathering method to form a general understanding of our target users' experiences and challenges. The questionnaire would provide initial data such as their background in education, current occupation, and motivations for being in STEM. Additionally, the questionnaire allowed for easy dispersion to participants in larger numbers by link forwarding. To recruit participants, team members were tasked with reaching out to their own networks of friends, peers, and acquaintances for primary stakeholders (current students). Furthermore, the study was promoted on personal social media pages such as Instagram to reach a broader audience of students and working professionals. One set of questions were formulated for distribution among primary and secondary stakeholders ([Appendix C](#)), and a second set for tertiary stakeholders ([Appendix D](#)). This allowed for customised questions that would yield meaningful data from the participants for the study. We realised there was considerable overlap between the questions for primary and secondary stakeholders as many secondary stakeholders were once primary stakeholders and could have valuable input to share. Therefore, we decided to only use one questionnaire and formulate the questions in a manner that was applicable to both groups. A combination of open and closed-ended questions were included such as; “Have you experienced any challenges/barriers to STEM women gaining support for career opportunities? What are some benefits you have experienced through participating in STEM-related extracurriculars/resources?”. The questionnaires were created in Google Forms and distributed to participants by link.

Interviews

Following the questionnaire, the team decided to implement interviews into our data gathering methods. Interviews allow for a deeper understanding into the participants experience, by capturing deeper thoughts and nuances through their answers for context. A semi-structured method was selected to allow for the interviewer to probe for deeper answers from the participants. Specific questions were created to examine participants' thoughts and feelings further as well as exploring past experiences as an individual in the STEM field. Two sets of interview questions were created for primary ([Appendix E](#)) and secondary ([Appendix F](#)) stakeholders with respective questions directed to their experiences.

The order of questionnaire and then interview was intentionally organised in this way to allow the team to collect general data before approaching participants for a more in-depth interview. The questionnaire prompted demographic questions and the option to consent for an interview to participants. From this data, team members were able to select participants who aligned with the demographic we were aiming to collect for the interview. In total, we interviewed 8 participants, 5 from our primary stakeholder group and 3 from our secondary stakeholder group.

A consent form ([Appendix B](#)) was then emailed to each participant including; the purpose and process of the study and a disclaimer of the confidentiality of the data collected from the interview. After the consent form was returned, an in person or virtual Zoom meeting was organised between the team member and participant. Based on the participant, the team member then used the respective protocol to guide the interview and take notes. The interview was conducted by team members using the question guide and having further discussions where appropriate while taking notes in document for later analysis.

Study Protocols

The study protocol ([Appendix A](#)) outlined the full purpose of the study; to understand the existing support for women-identifying students in STEM education and identify the resources they need to navigate their careers within an inclusive environment. Furthermore, the protocol summarises the process, participant demographic, and risks to the study.

3 Key findings

1. Targeting our solution towards identifying challenges women face in pursuing a career in STEM is a well-motivated scope.

Our questionnaire received 46 responses in total, targeted toward primary and secondary stakeholders. 65.2% of participants reported experiencing challenges/barriers in gaining support for career opportunities ([Appendix F1](#)). 54.3% of participants identified as a racialized person/person of colour and 15.2% reported that they are uncertain of whether they identify with this description ([Appendix F1](#)).

With the majority of our participants having experience in pursuing a career in STEM, the responses should be considered in conjunction with the demographic data collected to gain a holistic perspective on the targeted problem. Moreover, 89.1% of participants reported that they decided to pursue STEM due to personal interest over external factors such as influence from family and friends ([Appendix F1](#)). Through the interviews with primary stakeholders, there is a lack of mentorship experience among interviewees, despite their expressed interest in gaining more connections in the field ([Appendix F3](#)). When asked about reasons why they have not pursued mentorship experiences, common responses to highlight include not knowing which questions to ask the mentors and the desire to seek a more personal relationship or friendship. The high percentage of participants expressing an intrinsic motivation for

pursuing STEM demonstrates the relevance of our targeted problem, and the importance of providing women with the support they need in order to maximise their chances of succeeding in the field.

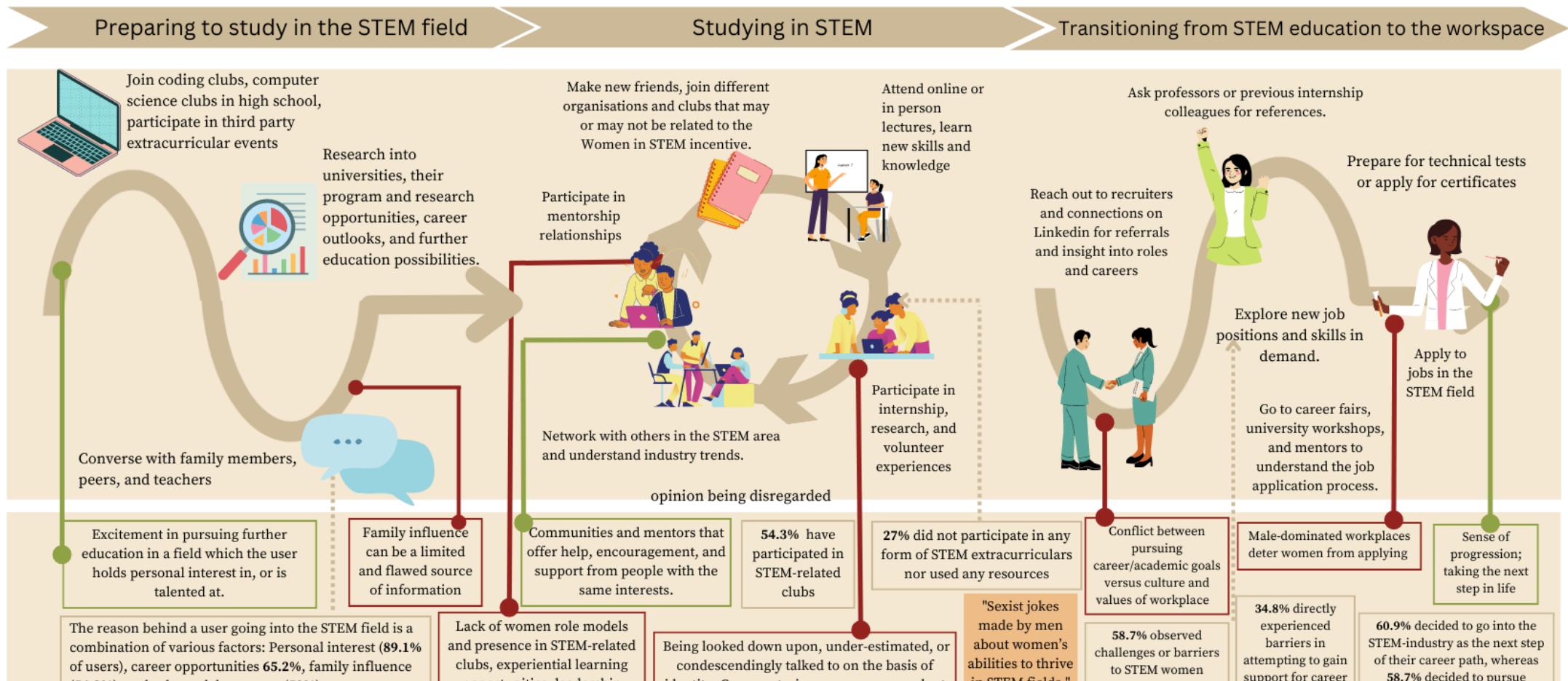
2. The male gender plays a key role in the challenges/barriers that women experience.

One of the most common responses in the questionnaire describes the challenge in establishing a collaborative relationship between the male and female gender ([Appendix F1](#)). It is important to highlight from the responses the frequency of the terms “male-dominated” and “harassment” in both sexual and racial contexts. Some examples of how the male gender are involved in a real or perceived barrier for women in STEM include “sexist jokes made by men about women’s ability to thrive in STEM fields”, “feeling left out of networking opportunity”, and identifying a “gender wage gap” ([Appendix F1](#)). This further motivates the male population to be a part of our stakeholder group, as their gender and their social relationship with women in STEM may play a critical role in the development of our solution. In our interview with a male stakeholder, the interviewee expressed that although he agrees that men have a role to play in supporting women in STEM, he is uncertain as to exactly what actions to take in order to achieve that goal ([Appendix F3](#)). This finding is important because it highlights a design opportunity to involve participation from men, but precise methods need to be identified through further research.

3. Access to career opportunities in STEM is perceived to depend on connections formed in the field through networking.

In an interview with a male stakeholder, it was highlighted that potential barriers women face include the lack of female role models in STEM and the difficulty in forming connections with peers in a male-dominated field ([Appendix F3](#)). This response aligns with responses from other female interviewees, where a common challenge they faced was achieving recognition from their male peers or colleagues and overcoming stereotypes related to certain fields in STEM that are perceived to be associated with the male gender (such as computer science and engineering). On the other hand, from the questionnaires, participants reported that having industry connections, mentorship, and a supportive environment are key factors in procuring career opportunities in STEM. This key finding informs our design requirements to ensure that the design solution is able to facilitate connections among women in STEM. More importantly, this led us to an unexpected finding that the design requirement may also need to include opportunities to facilitate communication between the male and female genders to foster effective collaborations between the two groups.

Experience Map



THOUGHTS

- What can I do to best prepare myself for the university education experience?
- What are some opportunities related to my STEM field? What do people do in those opportunities?
- How should I combat imposter syndrome, pressure, stress?
- Do I feel fulfilled with the goals that I am currently pursuing?

FEELINGS

- Nervousness
- Uncertainty
- Excitement
- The discovery of self: goals, values, purpose.
- Proud as a woman in STEM
- Determination to achieve goals
- Self-doubt
- Frustration, intimidation, and insecurity due to gender imbalance in certain STEM fields
- Fear
- Uncertainty
- Nervousness
- Confidence or lack thereof
- Sense of fulfillment

Transitioning from STEM education to the workspace

Job Stories

Job Story 1

Motivation and purpose: This job story highlights the barriers that women in STEM face in terms of representation. According to the field studies, this appears more prevalent in disciplines such as engineering and computer science, and less so in life sciences where the gender inequality seems to be lower. The field studies and interviews conducted with both primary and secondary stakeholders show the lack of women role models both in education institutions and in the workplace. Participants emphasise how this creates an intimidating environment, and women then have to step out of their comfort zone in order to make connections. This is often met with rejection or misunderstanding from the male-identifying instructors, peers or colleagues at work. This is often attributed to the different style of communication used by the men. Moreover, because of the lack of women presence, some individuals feel the need to constantly try to be the best in the room in order to prove their worth. All in all, this job story shows the anxieties that women face as minorities in male-dominated fields.

Job Story: When I, as a woman, am enrolled in STEM-related courses or programs where the majority of students and possibly instructors and teaching assistants are men, I want to be able to discuss and interact with my peers or instructor and make friends in a non-intimidating environment with people I can identify with so that my opinions and efforts are validated and heard, not misunderstood.

Job Story 2

Motivation and purpose: This job story highlights the barriers that women studying STEM face in mentorship programs. According to the field studies, although some women were able

to acquire guidance from mentors, they were often not able to relate to them. One reason is because their mentors were not on a similar career path that they would like to pursue. Furthermore, their mentors might not share a similar personal background as them, and so the advice and mentorship they attempt to provide to the mentees is not relatable. Therefore, women-identifying students are not able to freely express themselves and effectively receive the help, support, and guidance they need in order to move forward confidently to the workforce. These all render the mentorship experience unhelpful. All in all, this job story shows the barriers that women face in mentorship programs because of a lack of mentors that they can identify with.

Job Story: When I, as a woman and student in STEM, am enrolled in official or unofficial mentorship experiences, I want to be able to discuss and interact in a non-intimidating environment with people I can identify with, who are currently pursuing a career path I would like to follow, so that I can freely express my concerns and get adequate help, support and guidance with my career choices.

Job Story 3

Motivation and purpose: This job story highlights the barriers for women in STEM to acquire resources and stay informed about industry recruitment-related information and relevant opportunities. According to the field studies, because of the lack of role models and other women in STEM, as well as the barriers to form meaningful connections, women are sometimes left out and therefore not informed about relevant information that might help further their career. From the interviews, participants expressed they value knowing how to craft a resume, applying to specific programs and sharing learning opportunities that can be gained from having connections with others in the field. All in all, this job story shows the barriers that women in STEM face in regard to staying informed and ready for recruitment.

Job Story: When I, as a woman and student in STEM, am preparing to enter the workforce from my university education, I want sufficient resources that can guide my transition , advice on how to approach recruitment, and other practical skills so that I am informed and ready for recruitment.

Job Story 4

Motivation and purpose: This job story highlights the barriers and most specifically, the anxieties that women in STEM face in preparing to enter the workforce. According to the field studies, because of the lack of women in STEM, women feel a strong sense of imposter syndrome during their education. In addition, in the interviews, women planning to enter the workforce upon graduation mention they feel less intelligent in comparison to men, and also feel intimidated when entering a workforce that is male-dominated. Furthermore, the male participants have also mentioned that they observed the women in their STEM courses to appear less confident than the men. In essence, this job story aims to show how the imposter syndrome that women in STEM face during their education can and will likely follow them when they prepare to enter the workforce.

Job Story: When I, as a woman and student in STEM, am preparing to enter the workforce from my university education, I want guidance in my transition and relatable advice so that I am able to combat imposter syndrome for the rest of my education and once I start working.

Job Story 5

Motivation and purpose: This job story highlights the lack of knowledge from those who do not identify as women in regard to the barriers that women face in STEM. According to the field studies, men sometimes tend to not notice these barriers because they themselves do not face it. This can then lead to a lack of compassion when women are actively trying to address

these barriers. Thus, this job story highlights how women in STEM would like for others to acknowledge these barriers and collaboratively work towards eliminating them.

Job Story: When I, as a woman and student, am enrolled in a STEM degree, I want others, including men, instructors, and recruiting managers to understand the barriers that women face in STEM so that they can help eliminate the barriers and provide women with a better environment to succeed in their career.

Design Requirements

Design Requirement 1

The system must provide encouragement to women studying in STEM to reduce imposter syndrome and promote confidence in order to better navigate male-dominated workspaces.

Motivation and purpose: From questionnaires and interviews of primary stakeholders who identify as women in STEM, there is a strong consensus on the natural tendency for the male-dominated workspace to be intimidating. As well, being sometimes the only woman within this environment, networking and connecting to colleagues requires the user to acquire a different method of communication. As a result, this fear and uncertainty often worsen as women-identifying STEM students transition from education to the workforce, causing many women to have imposter syndrome and lack of confidence. Therefore, in order to design a solution in aid of the scope, mentally empowering the studying women in STEM is a key functional requirement that must be addressed.

Design Requirement 2

The system must allow women in STEM education to find other women in STEM education and/or industry who have faced similar barriers.

Motivation and purpose: Due to the male-dominated nature of the STEM field, women in STEM often feel incredibly isolated. Therefore, even when they attempt to voice their opinions, it is sometimes brushed aside due to the inability for the male students, colleagues, and even superiors to empathise with them. However, from the questionnaire and interviews, it appears that if there are a group of people, usually also women in STEM, who can connect and relate to these unique, women specific problems, it is much likely for these issues to be resolved as these complaints will be taken seriously. As a result, it is incredibly important for there to be a platform that allows the women in STEM to find other women-identifying individuals in STEM in order to be heard and supported.

Design Requirement 3

The system must take a user's demographic and background into consideration because women need role models who have experienced a similar growth trajectory.

Motivation and purpose: In our modern, diverse world, it can always be assumed that although two individuals may share the same job title, they may have incredibly distinct experiences leading up to this point due to their unique demographic and backgrounds. Therefore, even though establishing women role models are incredibly important in helping the studying women in STEM, it is also clear that the mentorship experience will be much more fruitful when the mentees are paired up with mentors who are able to identify experiences in common beyond sharing the same gender. As a result, not only must we design a solution that takes into consideration the end experience – the job title the mentors possess, we should also prioritise these unique backgrounds that the mentors and mentees share in order to create a more personalised learning experience.

Design Requirement 4

The system must encourage collaboration between both males and females to bridge the gender gap in STEM through facilitating collaboration and communication in a safe space.

Motivation and purpose: Evident from the field studies, there is a lack of role models for women in STEM, partially due to the field being perceived as a male-dominated one. The lack of female representation presents a barrier for women to build connections with peers and colleagues, particularly when women find it difficult to establish collaborative relationships with the men ([Appendix F1, F3](#)). A common response from the questionnaire highlights a hostile and disrespectful attitude towards the female gender, whether perceived or experienced. Examples from the questionnaire include experienced or observed cases of sexual harassment, inappropriate comments, and stereotypes against women in STEM ([Appendix F1](#)). This social dynamic has created a barrier for women to network with fellow peers and colleagues in the field, particularly when most of the population are male. Therefore, in order to encourage collaboration and communication in the male-dominated STEM environment, having the support of not only fellow women in STEM, but also the male counterpart will allow for a proactive approach to practise respect for one another and bridge the gender gap, addressing one of the root causes of a broader systemic problem.

Design Requirement 5

The system must provide women in STEM with relevant resources about industry recruitment-related information and other available opportunities.

Motivation and purpose: Our field studies show that because of several factors that prevent women from forming meaningful relationships such as unrelatable mentors or feeling intimidated in male-dominated fields, women are often left out and not informed about

important information that can help further their career. Therefore, women are put at a disadvantage because they are not well informed and they miss out on opportunities. This includes missing out on networking events, information regarding relevant clubs and academic learning opportunities. Moreover, women also miss out on information regarding job postings or the knowledge on how to go about navigating job applications and reaching out to recruiting managers.

Contribution Table

Member	Task	Estimated Time
Chyna	Research-writing questionnaire questions	1.5 hours
	Research-writing interview questions	2 hours
	Research-conducting interview + notes	0.5 hour
	Field Studies-data method justification, protocol description	3 hours
	Appendix Organization	0.5 hour
	Design Requirement	1 hour
	Proof-reading	1 hour
Cindy	Presentation slides + compiling notes + research for stats	2 hours
	Research - writing questionnaire	1.5 hours
	Research - writing interview questions	1 hour
	Research - writing protocol/consent form	0.5 hour
	Research - conducting interviews + clean-up	1.5 hours
	Research - compiling questionnaire data into spreadsheet	2 hours
	General Problem Section (general problem description, research + background, stakeholders, persona)	6 hours
Lucy	Proof-reading	1 hour
	Research - writing questionnaires (primary, secondary, tertiary)	4 hours
	Research - writing interview questions	0.5 hours
	Research - conducting interviews	2 hours
	Research - summarizing questionnaire & interview data	3 hours
	Design Requirement	0.5 hour
	Proof-reading	1 hour
Maggie	Presentation	1 hour
	Research - reviewing and adding to interview and questionnaire questions	2 hours
	Presentation - adding content to slides and practicing/presenting slides	1 hour
	Research - conducting interview	0.5 hours
	Research - protocol and consent form	0.5 hours

	Experience map planning and visual	5 hours
	Proof-reading final report	1 hour
Umayrah	Research - reviewing and amending questionnaire	1 hour
	Research - writing interview questions	1 hour
	Research - conducting interview	0.5 hours
	Writing Job Stories Section	3 hours
	Writing Design Requirements	0.5 hours
	Proof-reading	1 hour
	Presentation	1 hour
Tina	Presentation - presentation layout design and slides	3 hours
	Research - writing/proof reading questionnaire, interview questions (primary), protocol/consent form, meeting notes, A1 layout	4.5 hours
	Research - conducting interviews	1 hour
	Writing Experience Map Section & Design Requirements	5 hours

Appendices

A. Field Study Protocol

Research Protocol - Supports for Women in STEM

1. **Project Title:** Interviews and Observations of students in STEM.
2. **Investigators:** Chyna Hui (chyna.hui@mail.utoronto.ca), Cindy Ly (cindykim.ly@mail.utoronto.ca), Lucy Ma (lucyxinyu.ma@mail.utoronto.ca), Maggie Chen (maggiemc.chen@mail.utoronto.ca), Umayrah Chonee (umayrah.chonee@mail.utoronto.ca), Tina Zhang (yizhoutina.zhang@mail.utoronto.ca)
3. **Purpose:** The purpose of our research is to understand the existing support for women-identifying students in STEM education and identify the resources they need to navigate their careers within an inclusive environment. This will help us derive requirements for the design of novel interactive computational media that are intended to be useful to women in STEM. A brief description of our design problem is to investigate the unique problems women-identifying individuals face while navigating through the transitional period between academia studies and work force.
4. **Process to be followed:** We will distribute a questionnaire to be filled out anonymously by participants. We will then recruit participants from the questionnaire to complete a follow-up interview. For the interview, we will brief the participants about the purpose of the study, explain the consent form to them, and ensure that they sign the consent form. We will then engage the participants in an hour-long, semi-structured interview.
5. **Participant selection:** Participants will be chosen from individuals who study/studied in a STEM field. They will be identified via the questionnaire and selected according to their consent to interview and their education in STEM. In general, they will be characterised as being young adults having a STEM higher education/occupation in Canada.
6. **Relationships:** Our relationship to the participants may be described as follows: friends, acquaintances, and peers.
7. **Risk and benefit:** There will be minimal risk to the participants, for example that they feel that they have wasted their time. The only benefit will be to contribute to the education of the investigators. Participants are free to withdraw before or at any time during the study without the need to give any explanation.
8. **Consent details:** We will brief the participants about the purpose of the study, and explain the attached consent form to them, and ensure that they consent to participate and sign the consent form.
9. **Compensation:** Participants will receive no compensation.
10. **Information sought:** The information to be sought is described in the *attached script* for the semi-structured interviews.
11. **Confidentiality:** Information will be kept confidential by the investigators. Names or other identifying or identified information will not be kept with the data. The only other use will be to include excerpts or copies in the assignment submitted, but names and other identifying or identified information will not be submitted.

B. Consent Form

Consent Form: Supports for Women in STEM

I hereby consent to participate in a research study conducted by Chyna Hui, Cindy Ly, Lucy Ma, Maggie Chen, Umayrah Chonee, Tina Zhang
for an assignment in University of Toronto Computer Science 318, *Design of Interactive Computational Media*.

I agree to participate in this study, the purpose of which is to understand the existing support for women-identifying students in STEM education and identify the resources they need to navigate their careers within an inclusive environment.

I understand that:

- The procedure to be used is a semi-structured interview.
- I will receive no compensation for my participation.
- I am free to withdraw before or any time during the study without the need to give any explanation.
- All materials and results will be kept confidential, and, in particular, that my name and any identifying or identified information will not be associated with the data.

PARTICIPANT

Name (please print) _____

Signature _____

Date _____

INVESTIGATOR(s)

Name _____

Signature _____

C. Primary/Secondary Stakeholder Questionnaire

- a. <https://forms.gle/T1LERqvJJMTW9H3E8>



Women in STEM Questionnaire

This survey seeks to better understand the existing support for women-identifying students in STEM education and identify the resources they need to navigate their careers within an inclusive environment. We hope to encourage female success in STEM fields and related disciplines. Your opinion is very important to help us identify the measures to make STEM careers more accessible for women. Your responses will be recorded **anonymously**.

The survey results will be analyzed by a team of students at the University of Toronto as part of a course (CSC318H1: The Design of Interactive Computational Media). If you are interested in the results, please indicate it and leave your email address.

Thank you for taking the time to participate in our survey!

FAQs

Do I have to answer all the questions?

No. The questions are voluntary and you can choose 'prefer not to answer' to any or all questions.

Who will see this information?

This information will be visible only to our team and course facilitators (ex. professors, TAs). When used to inform our project design, the information will be combined with data from all other survey participants and no one will be able to identify any of the participants.

Do I need to be woman-identifying to fill this out?

Not at all. We encourage anyone who would like to complete the questionnaire to do so.

If you have any other questions please feel free to reach out at lucyma529@gmail.com

Part 1: Inclusive Demographic Data Collection

The questions below are used to support our team in better understanding the demographics of women in/pursuing STEM. The data we collect will be entirely anonymous and will only be used by our student team to inform our project in designing a solution to respond to the needs of women in STEM.

Please indicate which of the following best describes your age group.*

- Less than 18
- 18 - 24
- 25 - 34
- 45 - 54
- 55+
- Prefer not to answer

Please indicate which of the following terms best describes your gender identity.*

- Woman (cis, trans)
- Man (cis, trans)
- Genderfluid
- Genderqueer
- Nonbinary
- Questioning
- Two-Spirit
- Prefer not to answer
- Other: _____

What is the highest level of education you have completed (NOT currently attending)? *

- Less than high school
- High school
- College/CEGEP certificate or diploma
- Bachelor's Degree (e.g., BA, BSc, BEng, etc.)
- Professional Degree (e.g., Medicine, Law, Pharmacy, Dentistry, etc.)
- Master's Degree (Eg. MAsC, MSc, MEng etc.)
- Professional Degree (Eg. MD, DDS, JD etc)
- Doctoral Degree (Eg. PhD etc)
- Prefer not to answer
- Other: _____

Please indicate which of the following terms best describes your racial and/or ethnic identity. Select all that apply. *

- Black (e.g. African American/Canadian, people of African descent, Afro-Caribbean)
- Central Asian (e.g. Kazakhstan, Kyrgyzstan, Tibet)
- East Asian (e.g. Chinese, Japanese, Korean)
- Indigenous person of Turtle Island (North America)
- Indigenous person from outside Turtle Island (North America) (e.g., Aboriginal Person of Australia, Pacific Islander)
- Latino/a/x
- Middle Eastern, North African, and Southwest Asian (e.g. Iranian, Turkish, Egyptian)
- Pacific Islander (e.g. Hawaiian, Guamanian, Fijian)
- South Asian (e.g. Indian, Pakistani, Sri Lankan)
- Southeast Asian (e.g. Vietnamese, Cambodian, Thai)
- White
- Prefer not to answer
- Other: _____

What is the highest level of education you have completed (NOT currently attending)? *

- Less than high school
- High school
- College/CEGEP certificate or diploma
- Bachelor's Degree (e.g., BA, BSc, BEng, etc.)
- Professional Degree (e.g., Medicine, Law, Pharmacy, Dentistry, etc.)
- Master's Degree (Eg. MAsC, MSc, MEng etc.)
- Professional Degree (Eg. MD, DDS, JD etc)
- Doctoral Degree (Eg. PhD etc)
- Prefer not to answer
- Other: _____

Please indicate which of the following terms best describes your racial and/or ethnic identity. Select all that apply. *

- Black (e.g. African American/Canadian, people of African descent, Afro-Caribbean)
- Central Asian (e.g. Kazakhstan, Kyrgyzstan, Tibet)
- East Asian (e.g. Chinese, Japanese, Korean)
- Indigenous person of Turtle Island (North America)
- Indigenous person from outside Turtle Island (North America) (e.g., Aboriginal Person of Australia, Pacific Islander)
- Latino/a/x
- Middle Eastern, North African, and Southwest Asian (e.g. Iranian, Turkish, Egyptian)
- Pacific Islander (e.g. Hawaiian, Guamanian, Fijian)
- South Asian (e.g. Indian, Pakistani, Sri Lankan)
- Southeast Asian (e.g. Vietnamese, Cambodian, Thai)
- White
- Prefer not to answer
- Other: _____

Do you identify as a person with a disability? *

Persons with disabilities include those who may experience barriers to full participation in University life as a result of long-term, temporary, or episodic physical, mental/emotional, sensory, or learning disabilities, including those caused by chronic health conditions. It should also be noted that the social model of disability recognizes that disability is not created by any medical or physical condition, but rather by societal barriers. A disability may be evident or non-evident.

- Yes
- No
- Prefer not to answer

Do you identify as a racialized person/person of colour? *

The [Ontario Human Rights Commission](#) defines racialization as a process by which societies construct races as real, different and unequal in ways that matter and affect economic, political and social life.

- Yes
- No
- Not sure
- Prefer not to answer

Part 2: Experience for Women in STEM

Are you currently working or studying in the STEM (science, technology, engineering, mathematics) field? *

- Yes, working
- Yes, studying
- No
- Prefer not to answer

If yes, what concentration (occupation, major/program, etc.) are you in?

Your answer

If you are in STEM, please indicate what factors that have most influenced your decision to enter your field. Select all that apply. *

- Family influence
- Role models
- Peers
- Personal interest
- Career opportunities
- Prefer not to answer
- Other: _____

Have you **observed** any challenges/barriers to STEM women gaining support for career opportunities? *

- Yes
- No
- Prefer not to answer

Have you **experienced** any challenges/barriers to STEM women gaining support for career opportunities? *

- Yes
- No
- Prefer not to answer

If yes, please describe the challenge(s)/barrier(s) that you experienced and/or observed.

Your answer

Please indicate if you are currently participating or have participated in any **school** STEM-related extracurriculars/resources below. Select all that apply. *

- Clubs or student-led groups
- Mentorship program
- Informal mentorship
- Prefer not to answer
- None
- Other: _____

If you chose any of the options in the previous (except None), please name the organization(s):

Your answer

Please indicate if you are currently participating or have participated in any **third-party** STEM-related extracurriculars/resources below. Select all that apply. *

- Clubs or student-led groups
- Mentorship program
- Informal mentorship
- Prefer not to answer
- None
- Other: _____

If you chose any of the options in the previous (except None), please name the organization(s):

Your answer

What are some **benefits** you have experienced through participating in STEM-related extracurriculars/resources?

Your answer

What are some **challenges** you have experienced through participating in STEM-related extracurriculars/resources?

Your answer

What are the next steps in your career path? *

- Industry/Professional Experience (STEM)
- Further Education (STEM)
- Industry/Professional Experience (Non-STEM related)
- Further Education (Non-STEM related)
- No plans currently
- Prefer not to answer
- Other: _____

Do you know of any organizations that support women in STEM domestically and/or internationally? If yes, please list them.

Your answer

Last question: Would you be open to participating in an interview for us to learn more about your perspective and thoughts on how we can better support women in STEM? If so, please provide your email below.

Your answer

Thank you so much for your time!

If you have any other questions please feel free to reach out at lucyma529@gmail.com.

To assist us in our review of this data collection, please share any comments about the questions or this process with us here. We appreciate your feedback as we work to collect accurate and inclusive information.

Your answer

D. Tertiary Stakeholder Questionnaire

a. <https://forms.gle/DKhjd8BV1H5W4Xn8A>



Women in STEM Questionnaire

This survey seeks to better understand the existing support for women-identifying students in STEM education and identify the resources they need to navigate their careers within an inclusive environment. We hope to encourage female success in STEM fields and related disciplines. Your opinion is very important to help us identify the measures to make STEM careers more accessible for women. Your responses will be recorded **anonymously**.

The survey results will be analyzed by a team of students at the University of Toronto as part of a course (CSC318H1: The Design of Interactive Computational Media). If you are interested in the results, please indicate it and leave your email address.

Thank you for taking the time to participate in our survey!

FAQs

Do I have to answer all the questions?

No. The questions are voluntary and you can choose 'prefer not to answer' to any or all questions.

Who will see this information?

This information will be visible only to our team and course facilitators (ex. professors, TAs). When used to inform our project design, the information will be combined with data from all other survey participants and no one will be able to identify any of the participants.

Do I need to be woman-identifying to fill this out?

Not at all. We encourage anyone who would like to complete the questionnaire to do so.

If you have any other questions please feel free to reach out at lucyma529@gmail.com

chyna.hui@gmail.com (not shared) [Switch account](#)



* Required

Part 1: Inclusive Demographic Data Collection

The data we collect will be entirely anonymous and will only be used by our student team to inform our project in interpreting perspectives for designing a solution to respond to the needs of women in STEM.

Please indicate which of the following best describes your age group.*

- Less than 18
- 18 - 24
- 25 - 34
- 35 - 44
- 45 - 54
- 55+
- Prefer not to answer

What is the highest level of education you have completed (NOT currently attending)? *

- Less than high school
- High school
- College/CEGEP certificate or diploma
- Bachelor's Degree (e.g., BA, BSc, BEng, etc.)
- Professional Degree (e.g., Medicine, Law, Pharmacy, Dentistry, etc.)
- Master's Degree (Eg. MASc, MSc, MEng etc.)
- Professional Degree (Eg. MD, DDS, JD etc)
- Doctoral Degree (Eg. PhD etc)
- Prefer not to answer
- Other: _____

Do you identify as a racialized person/person of colour? *

The [Ontario Human Rights Commission](#) defines racialization as a process by which societies construct races as real, different and unequal in ways that matter and affect economic, political and social life.

- Yes

- No

- Not sure

- Prefer not to answer

Part 2: Experience for Women in STEM

Are you currently working in the STEM (science, technology, engineering, mathematics) field? *

- Yes

- No

- Prefer not to answer

If yes, what is your occupation?

Your answer

To the best of your knowledge, are there any efforts from your company/organization to recruit more women into STEM? *

- Yes
- No
- Prefer not to answer
- Other: _____

If yes, can you describe examples of those efforts? (Eg. funding opportunities designed to support women in STEM, training and mentorship programs etc.) *

Your answer

Have you **observed** any barriers to STEM women gaining support for career opportunities? *

- Yes
- No
- Prefer not to answer

Have you **experienced** any barriers to STEM women gaining support for career opportunities? *

- Yes
- No
- Prefer not to answer

If yes, please describe the barrier(s) that you experienced and/or observed.

Your answer

How beneficial do you think returnships are for people returning to work? *

*A returnship is a formal program that companies may offer to help people re-enter the workforce after an absence of a year or more.

1 2 3 4 5

Not Very Beneficial Extremely Beneficial

At your division or department, please indicate the percentage of women representation in STEM (including women in management and women in STEM in general).

- 0% (None)
- < 10%
- 10-30%
- 30-50%
- 50-80%
- 80-100%

Is there a lack of gender equality in STEM, in your experience? *

- Yes
- No
- Prefer not to answer
- Not Applicable

Have you observed or experienced any barriers to STEM women gaining opportunities that support career progression in your field? (For example, how individuals are selected for involvement in international activities, leadership positions, committees, etc.). *

- Yes
- No
- Prefer not to answer
- Not Applicable

If yes, please describe the barrier(s) that you experienced/observed and any solutions to overcome them *

Your answer

Please indicate the degree to which you would agree with the following statement: It is important to take action to increase the involvement of women and girls in STEM fields. *

1 2 3 4 5

Strongly Disagree Strongly Agree

If disagree / strongly disagree, please share more with us. *

Your answer

Do you know of any organizations that support women in STEM domestically and/or internationally? If yes, please list them.

Your answer

Does your CEO or the head of your organization put emphasis on diversity and inclusion and promote the concept of women in leadership? *

- Yes
- No
- Prefer not to answer
- Not Applicable

Does your organization currently have a diversity and inclusion-focused committee? *

- Yes
- No
- Prefer not to answer
- Not Applicable

If yes, has it been instrumental to promote leadership roles for women? *

- Yes
- No
- Prefer not to answer
- Not Applicable

If yes, how? Please share some details.

Your answer

Last question: In your opinion, what can we do to increase female participation in STEM fields?

Your answer

Thank you so much for your time!

If you have any other questions please feel free to reach out at lucyma529@gmail.com.

E. Primary Stakeholders Interview Protocols

Interview Questions - Primary

Introduction

Hello, thank you for agreeing to participate in our interview. The purpose of this interview is to better understand the existing support for women-identifying students in STEM education and identify the resources they need to navigate their careers within an inclusive environment. We wish to gain insight into the unique experiences that women in STEM encounter, and learn about what support systems they feel are available to them. The results from this interview will be analysed by University of Toronto students as part of a course (CSC318H1: The Design of Interactive Computational Media). Your responses will be treated anonymously, and you have the right to withdraw at any point in time, even after the interview has ended, no explanation needed.

1. Can you tell us a little bit about yourself? Starting with your age, and what you are currently studying in school.
2. IF they observed/experienced barriers (Probe: if they didn't go into detail about their barriers in the questionnaire, ask them to elaborate):
 - a. What support or resources, if any, do you feel would be helpful for you when you encountered these obstacles?
3. IF they have not observed/experienced barriers:
 - a. What are some systems in place, if at all, do you think have helped to reduce your observation/experience of these barriers?
4. Have you previously had a mentor?
 - a. IF YES:
 - i. How was your mentor able to provide you with the career/educational support you needed?
 - ii. Did you feel like your mentor was someone you could identify with or look up to based on their experience and skills? Do you feel they could relate to your challenges?
 - iii. Was there anything about your mentorship experience you wish went differently? Is there any aspect you would improve on?
 - b. IF NO:

- i. Is there a specific reason as to why you didn't have one? (Probe: barriers to access to mentors etc.)
 - ii. What are some advantages that you believe having a mentor would have provided you while navigating your career/education?
5. How are you preparing for the next step in your career/education? (Probe)
 - a. If going into workforce (includes working in industry and academia):
 - i. Are you currently concerned about transitioning from academia to the workforce? If so, what are some difficulties that are currently bothering you?
 1. Do you think the under-representation of Women in STEM has an impact on your ability to obtain your goal?
 - ii. If you are not concerned, what are some measures you have taken to ensure this peace of mind during the transition?
 1. What are some resources, if any, that have helped you in your journey?
 2. Do you think being/not being a member of Women in STEM (supporting counts as well) have helped you to attain this peace of mind?
 - b. If continuing in academia (meaning graduate/phD/post-doc - not in working positions):
 - i. Are you continuing your education in the STEM field?
 1. If yes, why? (Specifically, why not go into the workforce?)
 2. If not, what are you pursuing and why?

F. Secondary Stakeholders Interview Protocol

Interview Questions - Secondary

Introduction

Hello, thank you for agreeing to participate in our interview. The purpose of this interview is to better understand the existing support for women-identifying students in the STEM field and identify the resources they need to navigate their careers within an inclusive environment. We wish to gain insight into the unique experiences that women in STEM encounter in education and the workforce, and learn about what support systems they feel are available to them. The results from this interview will be analyzed by University of Toronto students as part of a course (CSC318H1: The Design of Interactive Computational Media). Your responses will be treated anonymously, and you have the right to withdraw at any point in time, even after the interview has ended, no explanation needed.

1. Can you tell us a little bit about yourself? Starting with your age, and education background, any previous and current jobs.
2. IF they observed/experienced barriers (Probe: if they didn't go into detail about their barriers in the questionnaire, ask them to elaborate):
 - a. What support and resources, if any, do you feel would've been helpful for you when you encountered these obstacles? (Probe: both in education and work contexts)
3. If they have NOT observed/experienced barriers:
 - a. In your opinion, what are some systems in place, if at all, that have helped to reduce your observation/experience of these barriers?
4. Have you previously had a mentor?
 - a. If YES:
 - i. Did you have this mentor during school or work?
 - ii. Can you describe how your mentor influenced the career/educational support you needed?
 - iii. Did you feel like your mentor was someone you could identify with or look up to based on their experience and skills? Do you feel they could relate to your challenges?

iv. Was there anything about your mentorship experience you wish went differently? Is there any aspect you would improve on?

b. If NO:

- i. Is there a specific reason as to why you didn't have one? (Probe: barriers to access to mentors etc.)
- ii. What are some advantages that you believe having a mentor would have provided you while navigating your career/education?

5. Have you ever **been** a mentor?

a. If YES:

- i. What are the reasons as to why you decided to become a mentor?
- ii. Do you feel you were able to provide your mentee with the support and resources they needed/wanted?
 1. Do you think that your mentee could identify with you and your experiences?
- iii. What are some of the benefits you felt from being a mentor?
- iv. What are some of the challenges you felt from being a mentor?
- v. Could you describe what type of insight mentees are most willing to hear you talk about?

b. If NO:

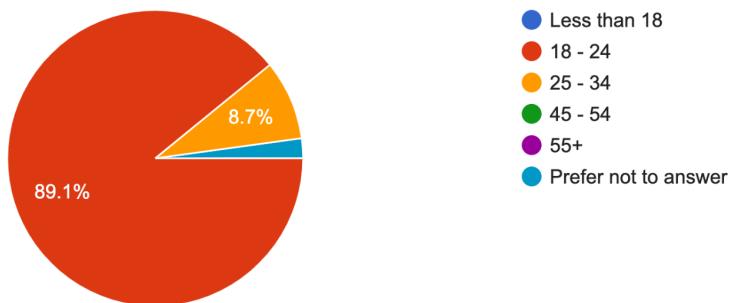
- i. Could you explain why you have never decided to be a mentor?

F. Raw Data

F1. Primary/Secondary Questionnaire

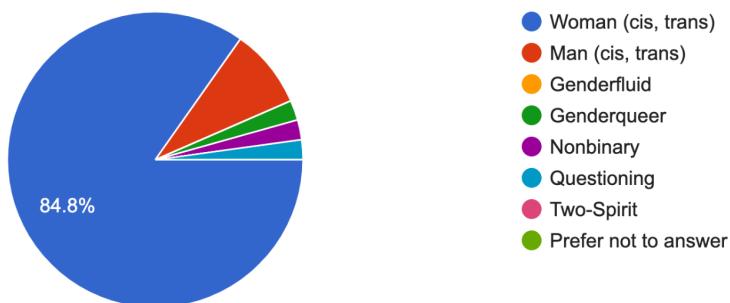
Please indicate which of the following best describes your age group.

46 responses



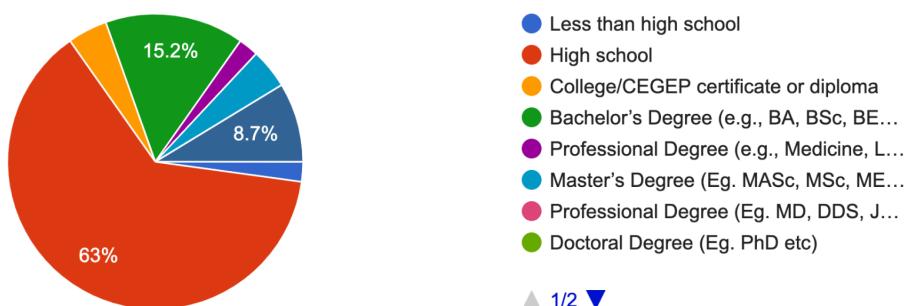
Please indicate which of the following terms best describes your gender identity.

46 responses



What is the highest level of education you have completed (NOT currently attending)?

46 responses

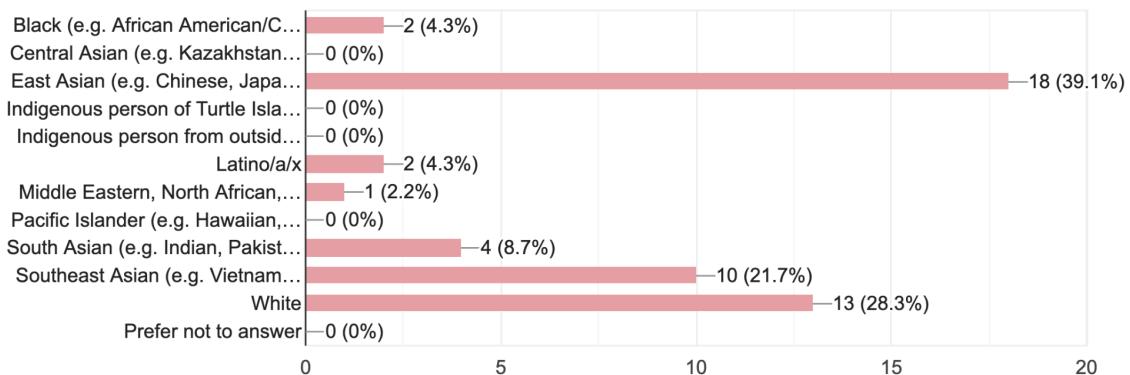


▲ 1/2 ▼

Please indicate which of the following terms best describes your racial and/or ethnic identity.

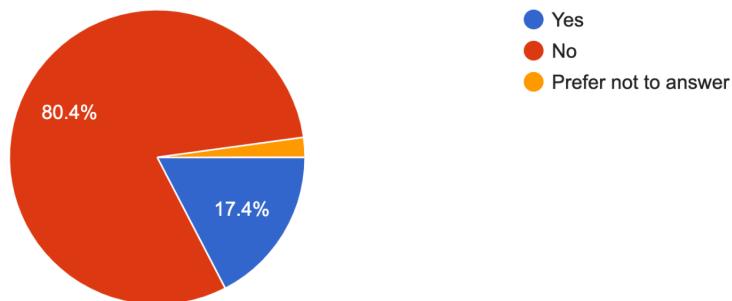
Select all that apply.

46 responses



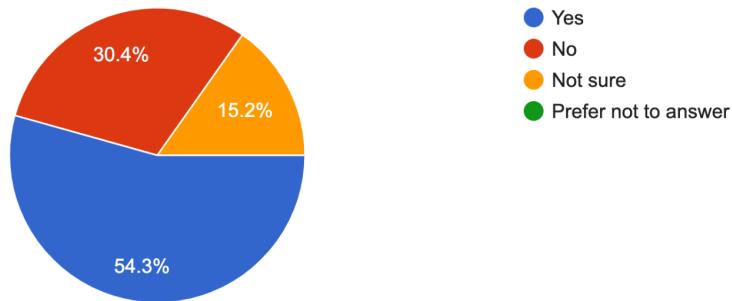
Do you identify as a person with a disability? Persons with disabilities include those who may experience barriers to full participation in University activities. A disability may be evident or non-evident.

46 responses



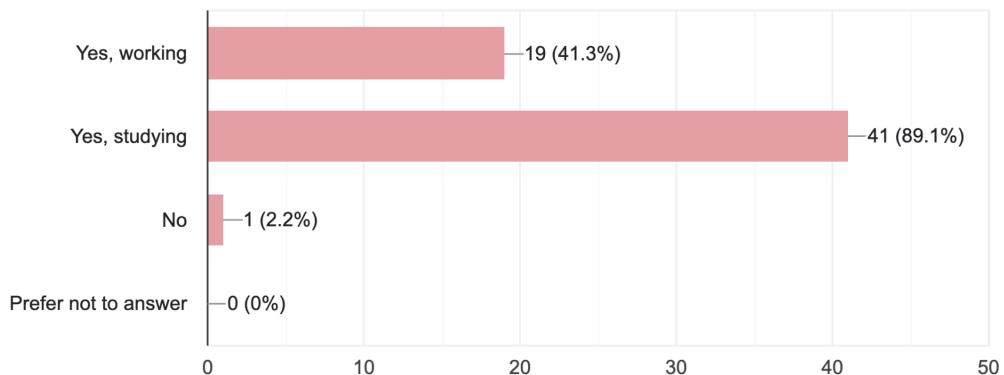
Do you identify as a racialized person/person of colour? The Ontario Human Rights Commission defines racialization as a process by which societies...er and affect economic, political and social life.

46 responses



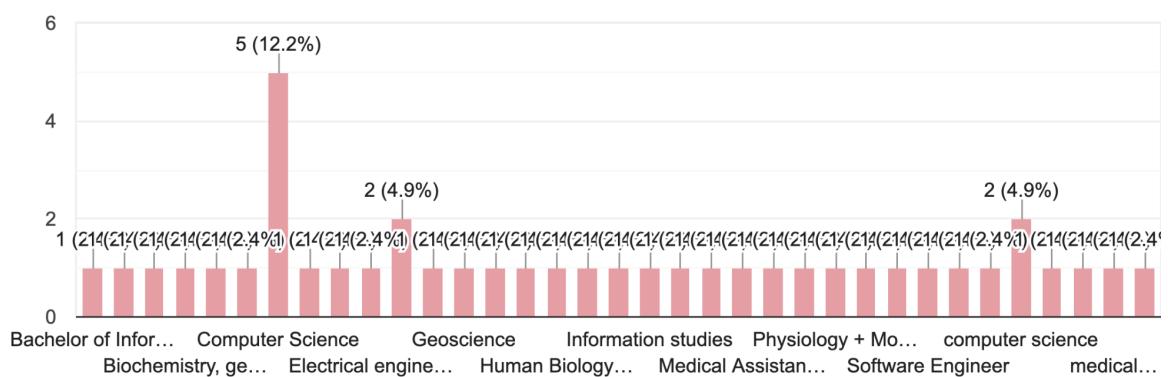
Are you currently working or studying in the STEM (science, technology, engineering, mathematics) field?

46 responses



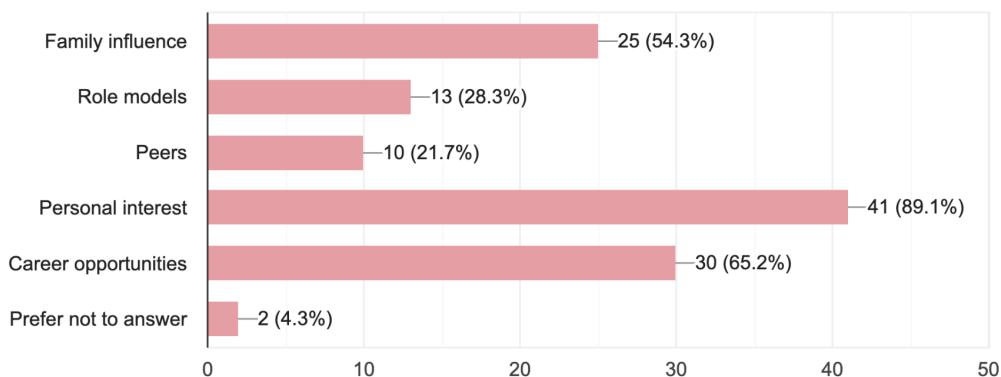
If yes, what concentration (occupation, major/program, etc.) are you in?

41 responses



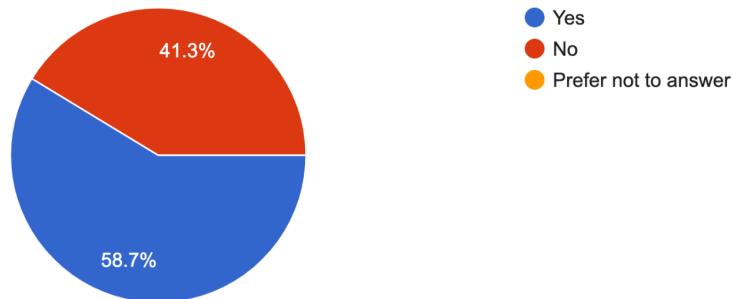
If you are in STEM, please indicate what factors that have most influenced your decision to enter your field. Select all that apply.

46 responses



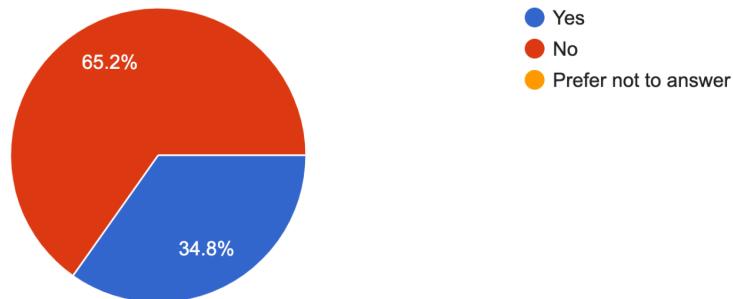
Have you observed any challenges/barriers to STEM women gaining support for career opportunities?

46 responses



Have you experienced any challenges/barriers to STEM women gaining support for career opportunities?

46 responses



If yes, please describe the challenge(s)/barrier(s) that you experienced and/or observed.

15 responses

Imposter syndrome, lack of accommodations for disabilities, lack of resources to achieve diagnosis for disabilities, economic barriers

less

Most were in high school - being one of a few to the only woman in tech classes. Having to deal with somewhat toxic behavior from men in the classes - like listening to them discuss make sexual jokes in class, watching explicit material in class, etc. It generally dissuaded me from being involved in technical clubs that weren't primarily aimed at women, which was most tech clubs in my school., which delayed me from starting to get involved in more technical subjects until late high school/university I also saw the same behavior exhibited towards other women as well.

Lack of support in pursuing higher positions in their careers

Gender wage gap, men's negative attitude toward women trying to achieve the same goals as them

Male dominated fields often have boy's club, can feel left out of networking opportunity

I haven't dealt so much with physical restraints or barriers, but more so social restraints. I was never stopped nor restricted from entering the space, but I think it is definitely intimidating since it's a very male dominated field. There are times where my male peers would under-estimate me. Although they would never explicitly state it, I could tell through actions (ex. the way they talk would be a little condescending, they would always take on leadership roles...etc.).

I know a woman in industry and she expressed having trouble getting promoted to a higher position. It could be because the organization is picky when it comes to promotions, but I know that she was failed to get promoted twice despite being a stellar employee so...

When I was in the science field, there was a much greater barrier in accessing internships in the hospitals and research labs, unless you knew someone who were already in these positions. Most of the time, opportunities were unpaid, making it a bigger barrier for those who can't afford to take an unpaid summer internship that won't help pay the bills. As I transitioned in the tech industry, career opportunities are often paid and higher than minimum wage, showing a much lower barrier of access for opportunities.

Sexism and harassment

very male-dominated

Women not being included or present in a lot of stem related clubs at school. Sexist jokes made by men about women's abilities to thrive in STEM fields.

People assume STEM is easier for men because there's more of them in these areas

N/A

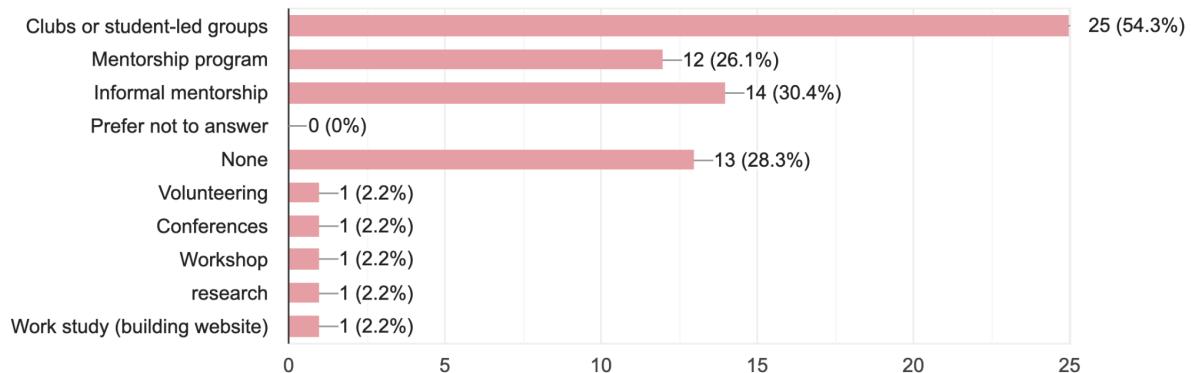
Your opinion being disregarded

The biggest one is financial access: I'm from a low income background & my job pays marginally above minimum wage, combined with the high cost of undergrad with limited institutional support. I'm also a CSA survivor and have experience frequent sexual harassment and transphobic harassment from professors. Institutions dont care (eg Reisz has faced 0 consequences even after determines to be guilty by several previous students; although I haven't worked with him personally, the trend of ignoring or punishing survivors is apparent). I've also observed, tho not experienced, racial harassment to my peers. These instances all force marginalized scientists out of stem and force us to choose a career that we love or our mental and physical health.

I haven't dealt so much with physical restraints or barriers, but more so social restraints. I was never stopped

Please indicate if you are currently participating or have participated in any school STEM-related extracurriculars/resources below. Select all that apply.

46 responses



If you chose any of the options in the previous (except None), please name the organization(s):

22 responses

High school level: Coding club; University: Engineering Ambassadors, Biomechatronics Design Team

Blue Sky Solar Racing, Computer Graphics club

UDesign, Ramuri

NSBE(National Society of black engineers)

HBSU, MSSU, CARRM

HOSA, Mentorship program with my college

Women in STEM organization chapter

Pre-Health Club, Computer Science Club

FRC robotics, lots of different talks that i cant remember the titles of, science fair, probably others.

A workshop aimed at young girls (don't remember name of organization)

iBioBuds, HealthHATCH, and mentoring from my own connections.

Data Science, robotics, coding

UWAFT - university of waterloo alternatives fuel team.

Engineering Ambassadors Waterloo, University of Waterloo Nanotechnology Research Group, University of Waterloo Alternative Fuels Team

CSSU

University of Toronto

UofT BizTech Association (UTBT)

Recognized Study Groups

Ecology and evolutionary biology graduate union (EGSA), QueerSphere/Engiqueers, GradSWE

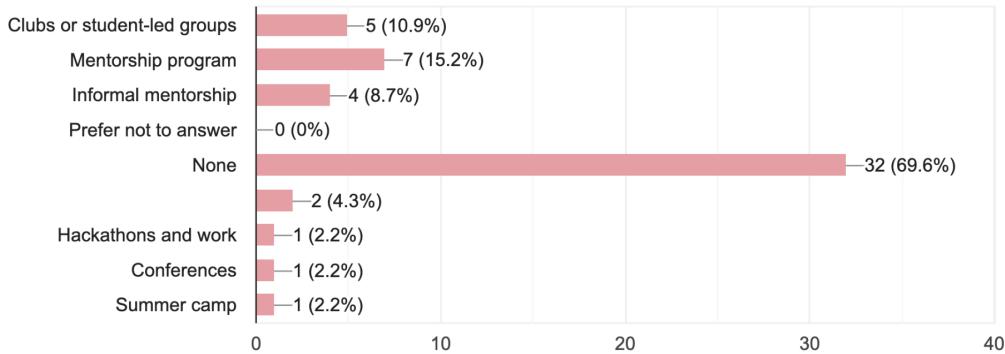
Just volunteering with a professor

BISA Executive, BISA Mentorship Program, iSchool Mentorship Program, Healthcare Student Group Mentorship Executive and Mentor, iSchool informal mentorship from Professors.

Sustainable Engineers Association

Please indicate if you are currently participating or have participated in any third-party STEM-related extracurriculars/resources below. Select all that apply.

46 responses



If you chose any of the options in the previous (except None), please name the organization(s):

10 responses

GEM mentorship program, Women in Tech mentorship program at work

ElleHacks and working at Wiz Robotics

ADP List

Hackathons, Engineering Outreach DEEP program, Girl's Saturday Engineering Program, Canada.ca Choose Science/Women Science Day

Geering up at UBC

Altitude mentoring

Data Science, Coding, ACM-W

N/A

Girls in Tech

What are some **benefits** you have experienced through participating in STEM-related extracurriculars/resources?

27 responses

Experience in engineering and technology, mentorship (career guidance, interviewing, resume critiques), networking and networking advice

Getting to see different fields and career opportunities, getting to meet peers with similar interests.

- There're a lot of people who looks for people with STEM experience, so there's a lot of opportunities out there.

- Learning new STEM skills, specifically technology skills because if you work in a STEM group, you meet people with different skills and knowledge so you naturally widen your perspective and knowledge by working with them.

Access to industry trends, new job positions and networks of employees and recruiters

Networking

learning about different career options in life science beside the well known ones

Having people with the same interested around.

Expanded my network of people in the industry

Got to find out what I did and didn't like about different STEM fields

Awareness of new opportunities or future jobs

Networking and advice from others.

Most people believe I'm super smart just by the fact I'm studying something related to stem

Opens my eyes to the whole field. I get to see what other people are working on. I get to learn more. I get to meet more individuals with the same interest. new friends and connections.

Meeting people who are interested in science like I am

What are some **challenges** you have experienced through participating in STEM-related extracurriculars/resources?

21 responses

Finding time for extracurriculars.

I haven't experienced challenges through participating in STEM related extracurriculars other than when people ask for other STEM skills that I do not have experience in. That's when it becomes complicated because people might no longer want to work with you. Having STEM skills is nice, but sometimes it feels like you need to know more than one STEM skill when you work in STEM related fields.

None experience personally

na

A lot of people want to participate in extracurriculars, so it can be difficult to get opportunities

Being able to thrive on the job and tasks given to me.

People are competitive and aren't really your friends.

Hazing culture baked into the teaching approach. Lack of intersectional approach. Non-holistic learning that

Females in a group setting seem to naturally be given a supportive role more often than a leadership role. As well, female group members ideas tend to be less dominant when opposed to a male proposing their idea.

Men usually expect less of me, they always want to leave me the easiest stuff

Some people are hard to work with. Some people don't have the same motivation as you. Takes time our of your day sometimes you are busy.

Feeling intimidated by everyone's knowledge

Managing exec positions and school has been a challenge.

To socialize with a very specific group of people made me cautious of being too comfortable with only people similar to me

Technologies that were not taught in school might be used, and I have to learn it on the job. Also, when applying to work study, there are many requirements that were not part of school curriculum, making it harder to participate.

N/A

Time, pushback from supervisors bc it takes time away from work

Time management

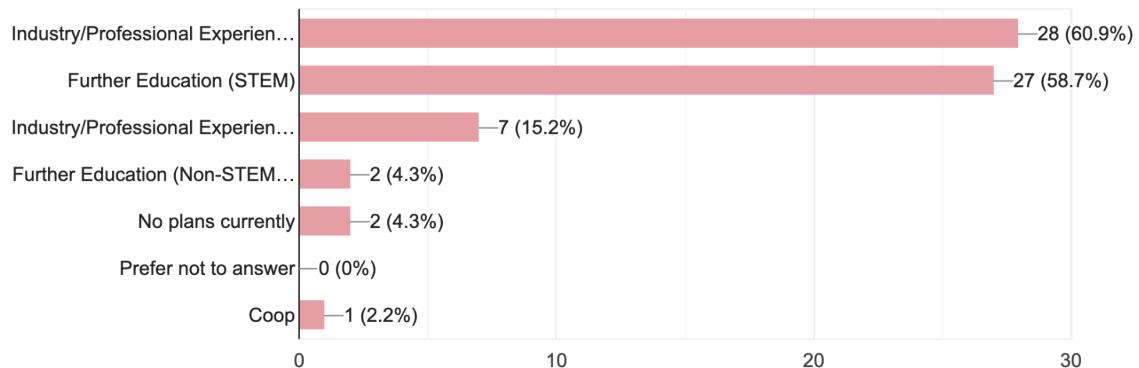
School-related resources in STEM are much easier to access since I can participate in these associations and even become a student executive. However, as I transition out of school, opportunities like these look like they must be paid for to be part of, or could only be found while you are already with a company (i.e. company mentorship program, further education, etc).

Don't want to make things awkward with people who have positive relationships with others

One challenge in participating in these extracurriculars is that it is sometimes difficult to find mentors/leaders in niche fields of STEM, such as power electronics. Thus, the "popular" fields of stem such as AI or software always get more attention and consequently more students go into those fields. The availability of STEM mentors in more well rounded fields would be really great to see.

What are the next steps in your career path?

46 responses



Do you know of any organizations that support women in STEM domestically and/or internationally? If yes, please list them.

19 responses

No
GEM mentorship program, hEr VOLUTION
Society of Women Engineers (USA)
Google
WISE
Women in Stem
No I do not know any
Not personally
Women in STEM, CAGIS

UofT Engineering Outreach, Girls Who Code, Women In Stem, I probably interacted with more but can't remember their names anymore.

ACM-W (The Association for Computing Machinery's Council)

My team has a Diversity and Equity Inclusion subteam, with the aim in supporting more inclusion in stem, women in stem being one of them.

N/A

GradSWE

Women in Stem club at my school

Women in STEM

Girls in Tech, ACM Canadian Celebration of Women in Computing

Women in Science and Engineering

Thank you so much for your time!

To assist us in our review of this data collection, please share any comments about the questions or this process with us here. We appreciate your feedback as we work to collect accurate and inclusive information.

3 responses

Looks great! Good luck on the project!

Nice survey, defo relevant in today's world

good length with clear questions

F2. Tertiary Questionnaire

Please indicate which of the following best describes your age group.

1 response



What is the highest level of education you have completed (NOT currently attending)?

1 response



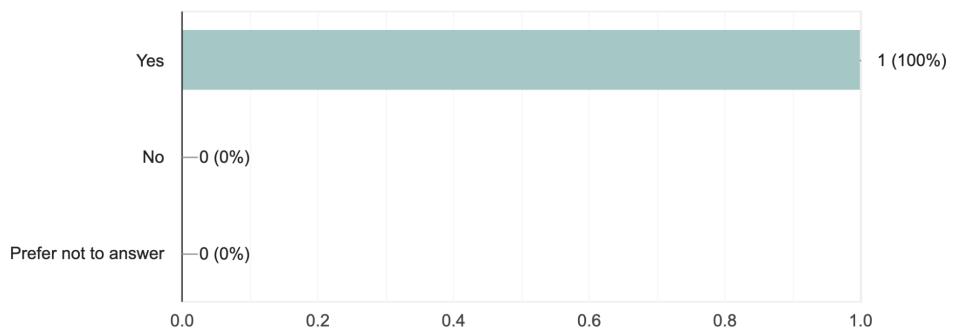
Do you identify as a racialized person/person of colour? The Ontario Human Rights Commission defines racialization as a process by which societies...er and affect economic, political and social life.

1 response



Are you currently working in the STEM (science, technology, engineering, mathematics) field?

1 response



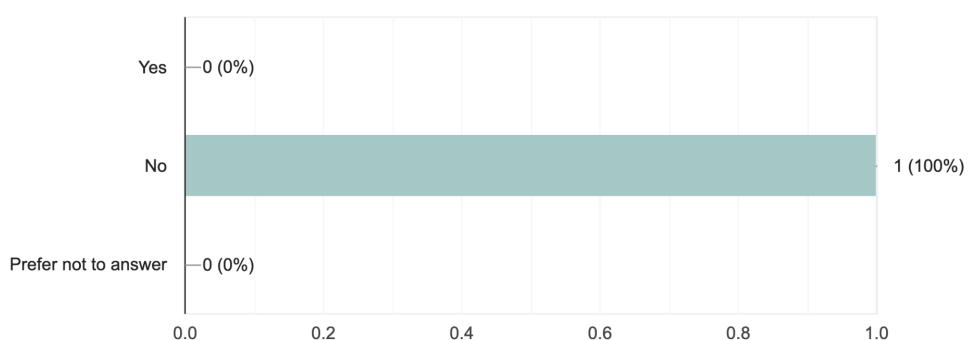
If yes, what is your occupation?

1 response

Assistant Registrar

To the best of your knowledge, are there any efforts from your company/organization to recruit more women into STEM?

1 response



Have you observed any barriers to STEM women gaining support for career opportunities?

1 response



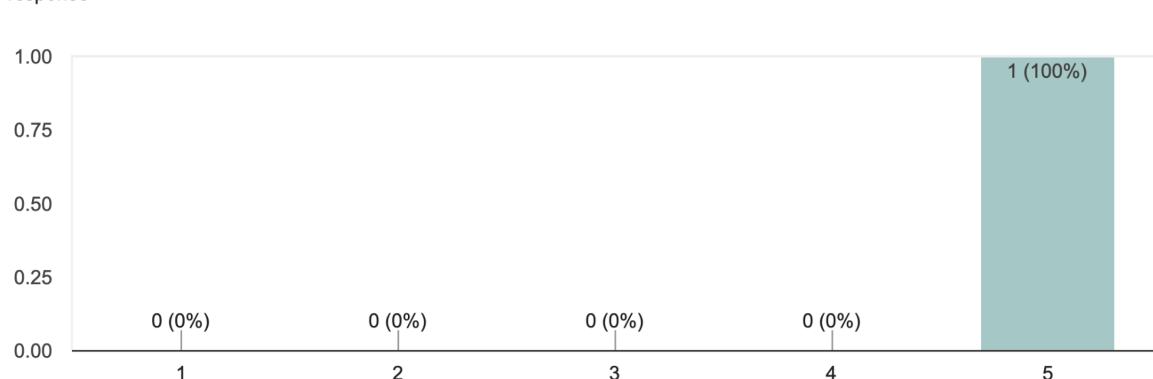
Have you experienced any barriers to STEM women gaining support for career opportunities?

1 response



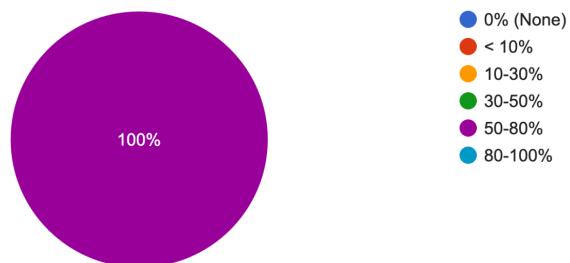
How beneficial do you think returnships are for people returning to work? *A returnship is a formal program that companies may offer to help people re...e workforce after an absence of a year or more.

1 response



At your division or department, please indicate the percentage of women representation in STEM (including women in management and women in STEM in general).

1 response



Is there a lack of gender equality in STEM, in your experience?

1 response



Have you observed or experienced any barriers to STEM women gaining opportunities that support career progression in your field? (For example, how i...ivities, leadership positions, committees, etc.).

1 response



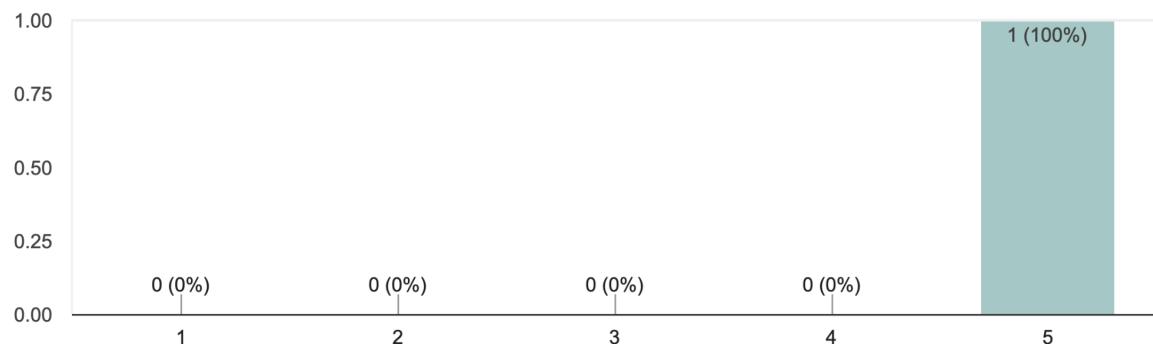
If yes, please describe the barrier(s) that you experienced/observed and any solutions to overcome them

1 response

When current students are applying to their respective fields, it is apparent that depending on the industry they choose to pursue, there can be discrepancies in number of females in the field or company.

Please indicate the degree to which you would agree with the following statement: It is important to take action to increase the involvement of women and girls in STEM fields.

1 response



Does your CEO or the head of your organization put emphasis on diversity and inclusion and promote the concept of women in leadership?

1 response



Does your organization currently have a diversity and inclusion-focused committee?

1 response



If yes, has it been instrumental to promote leadership roles for women?

1 response



If yes, how? Please share some details.

1 response

The faculty has a dedicated Equity, Diversity, and Inclusion program that actively organizes events and workshops, as well as promotes opportunities in education and career for women and other racialized groups

Last question: In your opinion, what can we do to increase female participation in STEM fields?

1 response

The education and awareness of the lack of women in STEM fields among members of power such as those on admission committees is essential to reducing some of these barriers for women. The promotion of resources available to women in STEM is also imperative to creating an inclusive and safe environment by ensuring they are aware of these opportunities and connecting them to it.

Thank you so much for your time!

F3. Interview Responses

Please refer to the google drive for raw data files on interview responses:

[Interview Responses](#)

G. Group Meeting Notes

January 26th, 2023 Meeting Minutes

NEXT MEETING: Tuesday January 31st @ 4-6pm

1. **App that encourages you to walk**
 - a. Carrot Rewards
 - b. Or like game-ified (Pokemon go)
2. **Price checker**
 - a. Input
3. **Highschool volunteer requirements/charity work unpaid (L, C,Ch, M)**
 - a. Categorize volunteer types, crowd sources volunteer activities by health care, etc.
 - b. Maybe something like [this](#) (?)
 - c.
4. **Friend group travel planning/booking/money share app**
 - a. A centralized place to plan things to do, where to go, money sharing, etc.
5. **Reverse AI art app (T)**
6. **Highschool students applying for university, central place to look for university (master/phd) (M)**
 - a. Compare programs from different schools (tuition, textbook cost, coffee chat)
7. **ADP List but for Women in STEM lol (L, C, U, Ch, T)**
 - a. mentorship platform to look for mentors (product design, product management, software engineering, tech jobs)
 - b. But for women in stem, BIPOC, talk to mentor in that demographic
 - c. Highschool or university student
 - d. WISE
 - e. Individualized matching, personality quiz => recommended mentors
 - f. UofT has something like that
 - g. Chat and call/video functions
8. Prevent food wastage - something like the app "**Too Good To Go**" (U)
 - a. "**Too Good To Go** is a service with a mobile application that connects customers to restaurants and stores that have surplus unsold food"
 - b. How is our idea **improving** on this app?:
 - Users who are able to upload food/produce will not only be businesses - can be random people within a community
 - We will allow users to register in groups within their communities and they will be able to upload food/produce that will go bad shortly and people registered within the community will be able to pick up these foods. (these users are not able to charge for this)
 - We will allow businesses to either give away their food for free or charge a small amount of money for it. (Too Good To Go gives their users "surprise bags of food" which we will not do, but rather users will be able to pick what they want)

Monday office hour?

Voting

Lucy - L
Cindy - C
Umayrah - U
Chyna-Ch
Tina-T
Maggie - M

January 31st, 2023 Meeting Minutes

We have to find a problem rather than a solution:

1. ADP List but for Women in STEM

- a. mentorship platform to look for mentors (product design, product management, software engineering, tech jobs)
- b. But for women in stem, BIPOC, talk to mentor in that demographic
- c. Highschool or university student
- d. WISE
- e. Individualized matching, personality quiz => recommended mentors
- f. UofT has something like that
- g. Chat and call/video functions

Problems:

- 1. Unique problem with women in stem working in the field
 - a. Sexism, workplace bias, stereotypes
- 2. Connecting students/new people navigating the field to mentors

Sponsorship!

There are female leaders in the field so we can empower others

Problem brainstorm!

WOMEN NOT REPRESENTED IN STEM

- **Why are there so many resources out there but there is still a gender imbalance?**
- **Because there is (see bolded text below)**

“The gender gap that exists in the STEM workforce cannot be blamed on differences in academic preparation,” the National Coalition for Women and Girls in Education wrote in a report released this month. Research has shown that women are no less capable than men in science and mathematics. But, according to the AAUW, external factors, like a **lack of role models**, cultures that tend to exclude women, and **persistent stereotypes about women’s intellectual abilities**, reinforce a wide gender gap. Even today, teachers and parents underestimate girls’ STEM abilities from a young age. From a historical perspective, at least in certain fields, we seem to have regressed.

- As of 2022, women make up 28% of the tech industry workforce.

- Women make up 34.4% of the workforce of the U.S.'s largest tech companies (Amazon, Apple, Facebook, Google, and Microsoft)
- Only 15% of engineering jobs are held by women, making it the STEM field where women are most highly underrepresented.

Problem!

1. It's super intimidating to be the only woman in a group of men, we don't have a spot!
2. Gender imbalance!
3. Undermining

1. CAREER UNCERTAINTY

Career uncertainty does exist, but it is exacerbated for women in stem!

Mentorship program problem: there's nothing to do!

- a. Initiative depends on student reaching out to mentors, nothing to keep the students & mentors in touch, no follow up, connect & leave you to it, mentors varies in background (they might need mentors too) mentors of mentors, poorly structured, "I can help you but I need someone else with this expertise", person you are connected to does not have the reach
- b. Computer science mentorship: all up to you, no structures, depend on the student to ask questions & engage, don't know what to ask the mentors about, what exactly you need help with, nothing to talk about
- c. Want to connect with someone to **help you figure out what you want** (career/future uncertainty, academia vs industry)
- d. Wish you can meet with multiple people so they can all give unique advice, explore what it is that you want

2. UNAWARE OF AVAILABLE RESOURCES

UofT has a lot of resources, but we don't know about it!!! Too late when we find out

You have to follow their instagram page, join the organization etc (difficult)

If you're in sociology/humanity etc, you will have no one to talk to to get into fields that are completely different from your own

- a. Club, initiatives, hackathons,

Stakeholders:

1. University students
 - a. Pros: easy to find
2. Mentors (graduate students, people in the field, etc. problem specific)
 - a. Masters of information
 - b. WISE: program for women in engineering (researchers and academia)
- 3.

Solution:

1. Meet with mentors but like Tinder

2. List of questions to recommend to mentee when asking mentors when they have no idea what to do
3. Zoom video call suggestions, survey that ask them what they think is a good question that the mentor asked you, rate your experience (5/4 stars etc,) would you like to share any questions you ask that you would like to share to others
4. Community thing: submit questions, fill out the number of stars

For Figma S1A group presentation

Why we did it

- Explain our motivation behind choosing the topic of barriers women in STEM face : Cindy already wrote about this in slides
- Limitations of existing solutions:
 - Programs that match mentors with mentees:
 - a. Mentors sometimes are unable to help the student with their specific problems for reasons such as it being out of their domain.
 - b. Mentees sometimes do not know what exactly they want (hence “career uncertainty” and are unable to fully take advantage of the time and expertise of the mentors they are connected with.
 - c. Mentees might not be connected with mentors that are relevant to the career they want to pursue.

What we did

- Who our stakeholders are
- Look for literature review/research/surveys - citations to show that this is a REAL problem; use numbers and stats

An introduction of the problem that your team will be exploring (e.g., stakeholders, limitations of existing solutions):

Problem statement: Career uncertainty does exist, but it is exacerbated for women in stem! How might we support university women in STEM in a way (see figma slides)

Problem space: - Not knowing what resources are available

Stakeholders:

Primary: targeted end users: Women attending university (undergrads, master student, phD)

Secondary: receive output or provide input to system : Women working in the field or working In academia - mentors and role models

Tertiary: others indirectly receiving benefits from system success or failure : Not sure??

Facilitating: design, development, maintenance : None (yet) ?

What is next

Your plans for the two methods you plan on conducting to better understand the problem (e.g., target participants, instruments you will use, protocol)

- Defining the scope and problem more
- Present alternatives we are considering (do we want to do that??)
- Target participants:
- The stakeholders that we mentioned above
- Two methods of research to better understand problem:
 1. Questionnaire
 2. Interview
- Samples questions for questionnaire:
- Samples questions for Interview:
 - > Describe some challenges that you face as a woman in STEM pursuing career related opportunities?

What we want your input on

- Did we miss any stakeholders in the scope of our problem?
- Are the types of questions that we gave as samples relevant to the problem that we presented?

February 7th, 2023 Meeting Minutes

GOOD TO KNOW:

- Every team member will send the questionnaire to 3 participants
- Focusing on primary and secondary stakeholders for research bc scope
 - Finding someone from our tertiary stakeholders to interview posed challenge

TASKS COMPLETED:

Create Task List

- Broke down tasks from high level

Questionnaire

- Updated questions

NEXT STEPS:

1. Work on [interview questions](#) (primary and secondary stakeholders)
2. Edit questionnaire with updates questions from: [this document](#)
3. Update table with who you're sending questionnaire to: [here](#)

February 8th, 2023 Meeting Minutes

Notes:

Going over A1 Formative Studies

Going over critique:

1. High school -> stem, university -> job force/higher education

People: undergraduate graduate phd women in stem

Why: transitioning period from academia to work force

Women make up 44% of undergraduate stem student <- high number

Why are there so much disparity when it comes to jobs

82% of women in engineering remains in the program while 77% of men do

Still disparity!

Significant numbers drop from undergraduate to graduate

People who are not in this demographic group

Rethink the scope

Make the workspace more diverse & etc vs. helping women in stem in academia w

Dont have to focus on one demographic but rather the question

Women focus perspectives in the general question

Barrier; Observe & experience <- break these two down

Can men experience these barriers? Men who wants to advocate for gender equality

Even division between primary & secondary stakeholders

The stage to find the problem

Interview: primary secondary specific questions vs general questions

Ideally different, information we're trying to extract from those different stakeholder groups are different

Is it ok if we include the wording of mentors & mentee?

What are some examples of resources you wish you've had, etc.

Can we ask about mentorship? (not leading? Solution oriented?) - Yes

Have two groups of people women & men -> how do we get it so that for one group we can be more aware of the support & other group can provide more help

H. References

- AAUW. (n.d.). *The STEM gap: women and girls in science, technology, engineering and mathematics*. American Association of University Women. Retrieved February 12, 2023, from The STEM Gap: Women and Girls in Science, Technology, Engineering and Mathematics
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- Gladstone, J. R., & Cimpian, A. (2021). Which role models are effective for which students? A systematic review and four recommendations for maximizing the effectiveness of role models in STEM. *International Journal of STEM Education*, 8(59). <https://doi.org/10.1186/s40594-021-00315-x>
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