



MIT THINK Scholars Program 2024-2025: Resources Section

Overview

This document is meant to act as a set of stepping stones for students that may be starting this application process without much direction or guidance on where to go for ideas, or how to get started.

To address this knowledge gap, the THINK team has addressed some of the most fundamental steps in writing a quality research proposal, which we hope will be able to answer some of those questions. These steps include:

1. Brainstorming Project Ideas
2. Completing a Literature Search
3. Next Steps After Submitting

For questions regarding how to submit the proposal and what to include, and for additional details on the program, please refer to the "Guidelines" pdf.

Finally, as this is the first year we are offering this resource, the THINK team reserves the right to take the pdf down as necessary to fix any errors or to add additional sections.

Please email us at think@mit.edu if you notice any errors or have suggestions for improvements.

- The MIT THINK Team

Brainstorming Project Ideas

Whether you're already passionate about a topic or just starting to explore, developing a project idea that's innovative, feasible, and personally meaningful is possible for everyone! Here's a guide to help you find and refine a great project idea.

1. Start with Your Interests and Passions

Begin by thinking about topics that excite you. Is there a particular field of science, technology, or engineering you're drawn to? Here are some questions to get you thinking:

- What issues or challenges are you passionate about addressing?
- Are there particular scientific or technological advances that have fascinated you lately?
- Have you identified any gaps or problems in existing technology that you think could be improved?

TIP: Sometimes, the best ideas come from simple observations. Pay attention to the devices, apps, and technologies you interact with daily.

2. Explore Real-World Problems

Researching issues in the world around you is a great way to identify potential project ideas.

Consider exploring:

- **Local Problems:** Look around your school or community. Is there a process or tool that could be improved?
- **Global Issues:** Are there challenges in areas like sustainability, healthcare, or accessibility that could be addressed with technology or engineering solutions?

3. Research Existing Solutions

Understanding existing solutions to problems in your area of interest can help you spot opportunities for improvement or innovation.

- **Look at Patents and Research Papers:** These resources can provide insights into how others have approached similar problems and reveal areas that may be unexplored.
- **Follow Industry News and Trends:** Keep up-to-date with the latest advancements and trends in technology, which could spark ideas for your own project.

4. Consider Scope and Feasibility

A good THINK project idea is realistic within a semester and a \$1,000 budget. When brainstorming, ask yourself:

- Can this project reasonably be completed within a few months?
- Is it possible to achieve meaningful results within the \$1,000 budget?

5. Refine Your Idea

Once you have a few ideas, evaluate them based on these criteria:

- **Insightfulness:** Does this idea offer a new perspective or solution?
- **Defined Goals:** Are there clear objectives or outcomes you want to achieve?
- **Practical Procedure:** Do you have a rough plan for how you might implement this idea?

Completing a Literature Search

Conducting a proper literature search is essential for any research project! It helps you understand what has already been explored, and how your research will provide new insights. Here's how to get started, along with some tips and cautionary points to keep in mind.

1. Starting Points

Before any searching, be sure to clearly define your research question! Identify any keywords and themes that will allow you to narrow down your search for any lingering questions, background information, and more.

2. Develop a Search Strategy

Highlight any keywords and use boolean operators (AND, OR, NOT) in your search to combine search terms as necessary. Use quotation marks for specific phrases and truncation for alternate endings to a word, reducing the number of variations for a word you need to search individually.

3. Choose Reliable Databases

Start with (and stick to) academic and peer-reviewed sources. Some places to start are:

- Google Scholar: A free tool for academic papers. It's an easy start to input your identified keywords, and, if necessary, find papers by particular authors. If you wish to find articles or papers with very specific keywords, you can use the advanced search for even more tailored searches
- PubMed: A database of papers that mostly pertain to innovations in health, medicine, and biology-related fields.
- Science Direct: A broad database that includes research across various fields such as life sciences, physical sciences, engineering, and social sciences. (Some sources may be behind a paywall!)
- JSTOR: A digital library of publications, journals, and books spanning several fields. (Some sources may be behind a paywall, however!)
- Association of Computing Machinery: ACM provides a digital library of articles and papers on computing and information technology
- arXiv: arXiv hosts several preprints in the fields of physics, finance, quantitative biology, and more. (However, papers are not peer-reviewed by arXiv, see Section 5 to evaluate sources)

- IEEE Xplore: Ideal for research on engineering, computer science, and physics. (Some sources may be behind a paywall!)

4. While Reading

Reading a paper fully can be overwhelming! Don't try to read every paper from top to bottom, instead skim the abstract and conclusion to determine if the paper is of relevance to your project!

If the article seems promising, be sure to take concise, brief notes including key ideas and questions. You could start a Google Doc, physical notebook, or use some free tools to organize references such as Zotero. While taking notes, do NOT plagiarize, always make sure to cite your sources in a consistent style (APA, MLA, Chicago, etc.)

5. Cautions to Take While Searching

Make sure that your source is credible! Even if from the mentioned databases, there might be misinformation. Be sure to check the authors' credibility and publication sources, and try to prioritize literature from peer-reviewed journals and recent publications.

Avoid using information from blogs or non-reviewed websites when conducting your literature search. Even with the papers you find in reputable databases, it's important to ensure that the sources and references they cite are reliable and support the information presented.

6. Be Patient!

Literature search is often an iterative process, so you might need to repeat previous searches to get more reliable information! Some databases or journals might restrict access to certain articles behind a paywall. If this happens, see if your school or local library offers access.

Next Steps After Submitting!

If your proposal was not accepted into THINK, there are still many opportunities to find support for research! Here are some ideas for next steps:

1. Finding a mentor

Local connections: Ask your teachers, guidance counselor, coaches, or anyone you know for recommendations. You could be surprised- maybe your science teacher has useful connections to local opportunities or universities that could guide you in the right direction.

2. Local colleges and universities: Professors at local universities may be open to providing mentorship for a project. It is best to reach out directly to professors whose research interests you. This process may take many cold emails, so you will have to be patient and persistent. If this works out, you will likely have a conversation with the professor in which you can learn more about their research and highlight your own ideas. However, many professors cannot offer an opportunity. In that case, it doesn't hurt to ask them to point you in another direction or recommend another program at the university.

3. Scholarships and Grants

Here are some other scholarship programs to apply for. Most of these will require you to submit a proposal in a specific research area, and then they will fund some of the projects up to a certain amount.

- National Institute of General Medical Sciences: Science Education Partnership Award
- Research Assistantships for High School Students (RAHSS) by US National Science Foundation
- High School Student Research Assistantships (MPS-High) by the US National Science Foundation
- American Chemical Society
- Lumiere Research Inclusion Foundation
- Davidson Institute Fellows Scholarship

- Sigma Xi Grants-in-Aid of Research
- Society for Science STEM Research Grants
- 3M Young Scientist Challenge
- Research in the Formation of Engineers (RFE)

4. Programs for High School students

Many universities have summer programs to support high school student research! Most of these programs are free of cost and provide living accommodations. This is a great way to meet people with similar interests, work with professors, and have access to university resources.

- Research in Science & Engineering (RISE)
- Research Science Institute (RSI)
- Summer Science Program (SSP)
- Young Scholars Program (YSP)
- Simons Summer Research Program

5. Submitting a Completed Project

There are many science fair competitions that you can submit a completed project to. This is a great way to share your work and meet other scientists!

- School/County/State/International Science and Engineering Fair
- Regeneron Science talent Search
- Sigma Xi Student Research Showcase
- Sigma Xi Annual Meeting
- JSHS (Regional and National)