



Concepts of Research

*High School Guide to Understanding and
Applying Principles of Academic Investigation*

Concepts of Research: A High School Guide to Understanding and Applying Principles of Academic Investigation

“It is the glory of God to conceal things, but the glory of kings is to search things out.” -Proverbs 25:2

What comes to mind when you hear the word research?

Often times the concept of research can evoke fear or dread as we imagine slaving away processing numbers and collecting the infamous *data*. However, from my experience working as a lab assistant, researching and studying in my own field, and generally growing in curiosity about how Creation was designed, I have found that the concepts of research are thoroughly enjoyable when you approach them from a specific perspective. This perspective is one of genuine curiosity. Are you wanting to *really* know something about a specific topic? Are you interested in how marine life flourishes? Do you wonder how we measure the temperature of distant stars? Have you ever wanted to dive deeper into the concepts of the physics of sound and how music is perceived psychologically? We start with curiosity. Next, we move to academic research publications. From there we piece together the puzzle of our question in the form of a paper. Once edited, this paper can drive widescale impact in the field to which it applies.

Research is much more than reading and sifting through data. It is a *process* of investigation aimed at exploring new ideas so that these ideas can be confidently applied.

We are always researching and shopping is an excellent example of this. Comparing prices to find the best product for the best prices is comparative analysis. This is the same in an academic aspect: Looking for the highest quality information from a reliable source. This concept is also applicable when formulating a research question (i.e. figuring out what question would generate an answer that could create the desired impact. Researchers are future-minded thinkers because we must ask questions, anticipate outcomes, and support the process.

Research has multiple different approaches, two of which will be covered in this guide. The **standard research process** is the collection of data and the generation of a paper that describes and interprets the data. This ranges from explaining the purpose of the research to describing the process of collecting data to interpreting what the data means. The ultimate goal of this is to apply what is discovered. Another type of research is **Literature Reviews**. These are done by reviewing journal articles and then *proposing* a new study design based on a new or different approach that was not reported in the articles. A literature review proposes something new because other similar published works do not cover the desired topic. The standard process utilizes published research to reach aid in reaching conclusions.

To begin your journey into exploring concepts that fascinate you, we need to formulate a research question. Let's apply this to one of your school subjects, preferably one you enjoy the most! Here are a few prompts to get you started:

Task 1: Laying the Groundwork for Your Research

Subject: _____

Which school subject are you going to focus on for your research? Math? Science? History?

Specific area of interest: _____

What is a specific aspect that is fascinating to you or that you want to know more about from the subject that you chose (above).

Reason for Investigation: _____

Why are you wanting to look deeper into the subject/specific area? This is the purpose of your research.

Hypothesis: _____

The hypothesis formula is This + That = Outcome (cause/result). Through your research, you want to determine if the stated hypothesis is true or not. A **Null Hypothesis** is simply the opposite of your stated hypothesis. Through statistics, we can determine which hypothesis explains the data.

Research Question: _____

State this in such a way that it would read like “we are looking into [this] because of [reason]. Through our research we hope to understand [hypothesis].”

NOTE: Your research question and your hypothesis are interconnected. Your research question is answered by your hypothesis, and your hypothesis is derived from your research question.

Next, dig through articles from peer-reviewed journals and other authoritative resources (such as government publications). Peer-review means that other professionals in the field have critiqued the article before it was published for you to access. So, you can be fairly confident that the research is acceptable. Our list of recommended resources should have been sent to your inbox when you downloaded this document. Here are a few for biology/health research questions:

- National Center for Biotechnology Information
- National Institute for Health
- Mayo Clinic
- Science Direct
- American Journal of Public Health
- The Lancet

Google Scholar is also an excellent resource for identifying papers to read through for your research. Just type “Google Scholar” into your search engine and this will take you to Google’s academic search engine.

Do not be intimidated by the length and depth of the articles you find. A quick technique to identify if the research will be helpful is to read the abstract. This is a summary of the entire paper and will identify if the paper fits your topic. Based on what you read, you can quote and paraphrase peer-reviewed papers and then make statements from these in the context of your hypothesis. Here is an example from a research paper on health innovation in Thailand:

Example

“More than 3600 newborns died in the first month of life mainly due to: prematurity, congenital anomalies, and birth asphyxia.”⁷ 12.8% of these deaths were directly related to birth related trauma and birth asphyxia.⁷ This tragically adds up to approximately 460 newborns who died due to birth asphyxia in 2017 ... Therefore, it is critical that intervention begin as early as possible for a better prognosis and likelihood of survival. This is especially critical since modern treatment for birth asphyxia is based in a hospital setting. A United Nations Population Fund article stated,

“The number of visits to health care services during the first 12 weeks of pregnancy among young mothers and pregnant women living along the Thai-Myanmar border is fairly low. Based-line studies by Thailand’s Department of Health point out that women and girls from ethnic minority backgrounds, prefer to deliver their babies at home which might put both mothers and new-borns at higher risks when complications happen during and after the birth delivery.”⁹

To support the mothers’ choices while also providing high-quality, lifesaving intervention regarding the issue of birth asphyxia, the program will need to be centered around the rural home. This means access to resources—especially healthcare and similar resources—is limited. This is possible through this program...

References:

- 7) Global Health Observatory - World Health Organization 2017 *Cited By* Thailand SRMNCAH Factsheet. WHO Regional Office for South-East Asia 2021. <https://apps.who.int/iris/bitstream/handle/10665/347435/Thailand-eng.pdf?sequence=1&isAllowed=y>
- 8) Gillam-Krakauer M, Gowen Jr CW. Birth Asphyxia. [Updated 2022 Aug 22]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK430782/> Accessed May 7, 2023.
- 9) Public-private partnership to ensure safe birth for vulnerable ethnic women during COVID-19 pandemic. UNFPA Thailand. <https://thailand.unfpa.org/en/Safe-Birth-for-All-story>. Published November 1, 2021. Accessed May 7, 2023

Note the in-text citations and the references list. There are many different ways to cite your sources. This example text illustrates AMA format. To avoid plagiarism, direct quotations and paraphrases require citation.

Now that you have your research concept written down and have a few article resources, it is time to format your paper. Research papers follow this format:

- **Abstract**
 - This is a brief summary of the entire paper.
- **Introduction**
 - Open your paper with an explanation of the research question, the importance of the topic, and the purpose of the paper.
- **Materials and Methods**
 - If you conducted your own research, this part is the explanation of the research process, how the data was collected, and any resources needed.
- **Results**
 - Now explain what you discovered through what you used in the Materials and Methods section.
- **Conclusion**
 - Based off of your results, what statements can be made to explain the data.
- **Discussion**
 - This section gives you space to further explain aspects of the data that should be looked into further, or to propose additional research stemming from your study.
- **References**
 - These are listed in the order in which they appear in your paper.

With these tools under your belt, you are equipped to explore and discover! Let us know what topics you are diving into! We would love to hear about all of the amazing and interesting things you discover and learn. Email us at shp@bju.edu or tag us on Instagram @bjushp. For other ideas on research or for help with the process, register for our virtual research workshops or reach out to us via email.

“The fear of the LORD is the beginning of wisdom, and the knowledge of the Holy One is insight.”

-Proverbs 9:10