Science – Research Projects

Greetings, Scientific Inquirers.

In Terms One, we looked at a lot of different areas of scientific exploration—everything from the engineering process for the Mars rover to the creation of the Universe to the physical and mental health benefits of spending time with trees. In Terms Two and Three, you are taking the reins: you will be taking a deep dive into a content area of your choice and creating a guiding question to focus and promote in-depth research.

With this research project, we are further developing two key skills that we have already spent time with this year: note-taking and time management.

I will be checking in with you during your research process, but the project really rests on your shoulders; it will be important to be putting focused, meaningful time into the work for several extended periods every week. This is not a project that you can leave to the last minute and hope to be successful with, and therefore it is a great opportunity to engage with any tendencies toward procrastination or work avoidance and the feelings that produce those (re)actions.

Your primary responsibilities will be **note-taking** and **tracking your sources**.

During Term Three, you will choose how you will share your learning—*you* will teach *us*.

I really hope that this will be a **fun** project for you and that you will be able to tap into an innate sense of curiosity and inquiry—trust yourself; listen to your instincts.

Note-taking Formats

Here's the part that will blow some of your minds: note-taking will be done by hand.

Science proves that students who take notes by hand show a deeper and longer lasting understanding of the material explored than students who type their notes. Something happens in the brain that allows this to be true.

So, you will need to show me notes in a variety of formats that we have already explored this year:

- Webs

- Sketchnotes

- Depth and Complexity graphic organizer

- A Lynda Barry doodle collage

Once you have shown me at least one source documented in each of the above formats, you will then continue, with the goal of creating your own, personalized system of note-taking that perhaps combines elements of each of those formats that makes sense to *you* and the way your brain works. We will discuss this further in class.

Regardless of format, **the criteria** for note-taking remains the same:

- **Use of Emphasis/Hierarchy of Size**: Are the Big Ideas and main sub-topics—and the really essential information—clearly identified in a way that pops out to you, the viewer?

- **Written in your own words**, unless you are recording a quote and clearly identifying the speaker or author of the quote

- **Using the fewest amount of words possible to express each idea**, will still working to achieve clarity of communication—this is where things like abbreviations and symbols will really help, as will breaking ideas down into chains of connected information

- **Use of visuals to capture complex information**—remember that a visual can be a labelled drawing,, but it can also be things like charts and tables and Venn diagrams and meoples and short comics

- **Systems of organization**—purposeful use of containers, color, and features such as a key or legend to help categorize information

- **Connections**—ways of showing connections to knowledge **within and across** the various sources you explore; **how you do the "across the various sources you explore" part is up to you**

- **Thoroughness of approach**—this is a Term-long project: that should be reflected in the quantity of your notes while still keeping in mind that we have other large projects that we are engaging in: what does several months worth of research look like?

- **A focus on depth and complexity**—collecting facts is just the first step; the real work is in exploring the how and the why beneath and between the facts

Regarding depth and complexity, here's one way to think about it:

If I were researching tennis star Rafael Nadal, in order to demonstrate depth and complexity, I would need to learn about and report on the following:

- How to play tennis
- The history of tennis
- The geography and history of Spain, particularly Manacor, where Nadal lives and was born
- The history of Spanish tennis players and how Nadal fits into and/or breaks these patterns
- Nadal's playing style, including how he changed the sport/broke the established patterns and rules of how players play
- How left-handed players differ from right-handed players, in terms of training and tactics
- How the brain functions in terms of left- and right-handedness, and what happens in the brain when someone who is naturally right-handed makes their left hand their dominant hand
- The playing style of his main rivals, Federer, Djokovic, Murray, and Medvedev, especially how these styles are different from Nadal's, and what challenges and advantages these differences give him
- The history of his injuries, including an understanding of how those injuries affect the body, how they are caused, and how they are treated
- A projection about what his future will be as a player, based on all of this knowledge

Tracking of Sources

You will need to be diligent about tracking your sources throughout this inquiry project.

Create a Word or Google doc to record these sources.

There is a required minimum number of different types of sources that you will need to engage with—you can, by all means, look at more:

- At least three (3) print sources (books! Real books!)

- At least eight (8) video sources (documentaries and YouTube-like videos)

- At least eight (8) on-line non-video sources—note, you can use Wikipedia as a starting point, but it does not count as one of your eight sources

- At least one (1) podcast

You will need to record the following information in your list of tracked sources:

Print Sources:

- Author(s)
- Title
- Publisher
- Date of publication

Documentaries:

- Director
- Title
- Production company
- Date of release

On-line Sources:

- Author or group name
- Title of page or article
- Full URL
- Date written/created; or, if that's not available, the date you retrieved the information (the date you view the page)

Podcast Sources:

- Host(s) name(s)
- Date of broadcast
- Episode title
- Podcast name
- FullURL

Guiding Question

After you have submitted your question to me, I may give you feedback. It will then be up to you to resubmit the final form of your question – I will not hunt you down for it.

Definition of Terms

This will be an on-going process. There are certain terms that you will need to define before you can begin your research, and there are terms that you will only be able to properly define after you have engaged in in-depth research.

For example, take the question "*Is there life in outer space, and if so, how will we know?*"

Some terms that you would need to define before beginning your research are:

- Outer space: do you mean outside of our solar system? Within our solar system? Both? Just the Milky Way Galaxy? Just the Local Group? Anywhere in the Universe?
- We: do you mean anyone and everyone? Scientists? Astrobiologists? Canadians? MACC students?

Some terms you would only be able to properly define after in-depth research would be:

- Life
- Outer space (furthering your initial understanding)

Use the template available on the class blog and continue to add to it as you go along. I will ask to look at it once during the first weeks of the project and once at the very end.

As you engage in your research, you may discover that more questions are generated that need answers in order for you to go further with your overarching inquiry question. Use the temple provided to ask and answer these essential questions.

Tips

- Consider making a checklist for your project

- Consider creating a calendar and use this to help set targets for each week

- Make goal journal-like entries when working at home

- Don't fritter away your class time in idle chatter with other people: talking is fine, but keep it centered on the work; the more you do in class, the less you will have to do at home

- Make sure that you don't get sidetracked by shiny information – ask yourself, "If this related to my question or is it just cool?" Consider keeping a "Cool Info" section in your comp book to satisfy the shiny information itch while keeping it separate from your notes.

As always, please do not hesitate to ask for help if you are feeling stuck.

Dig deep.

Don't be satisfied with easy or thin answers.

USE YOUR TIME WISELY.

Now, off you go…