



Participating in GLOBE student research IVSS project

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Former Science working group member

2 May,2024- GLOBE Africa annual regional meeting

Yaounde,Cameroon

From the workshop in Detroit annual meeting, 2019

How to plan for GLOBE-IVSS project

To better **Understand Ourselves**

STUDENT A

Homework	100%	A+
Projects	77%	C+
Quizzes	75%	C
Tests	73%	C-
Participation	93%	A
GRADE	83%	B

STUDENT B

Homework	50%	F
Projects	93%	A
Quizzes	100%	A+
Tests	100%	A+
Participation	67%	D+
GRADE	83%	B



Marks are not for comparison, however asking questions like Where can I try harder? Or Do I find biology easier to study for than Physics? Can help us understand our abilities.



Where should I start?

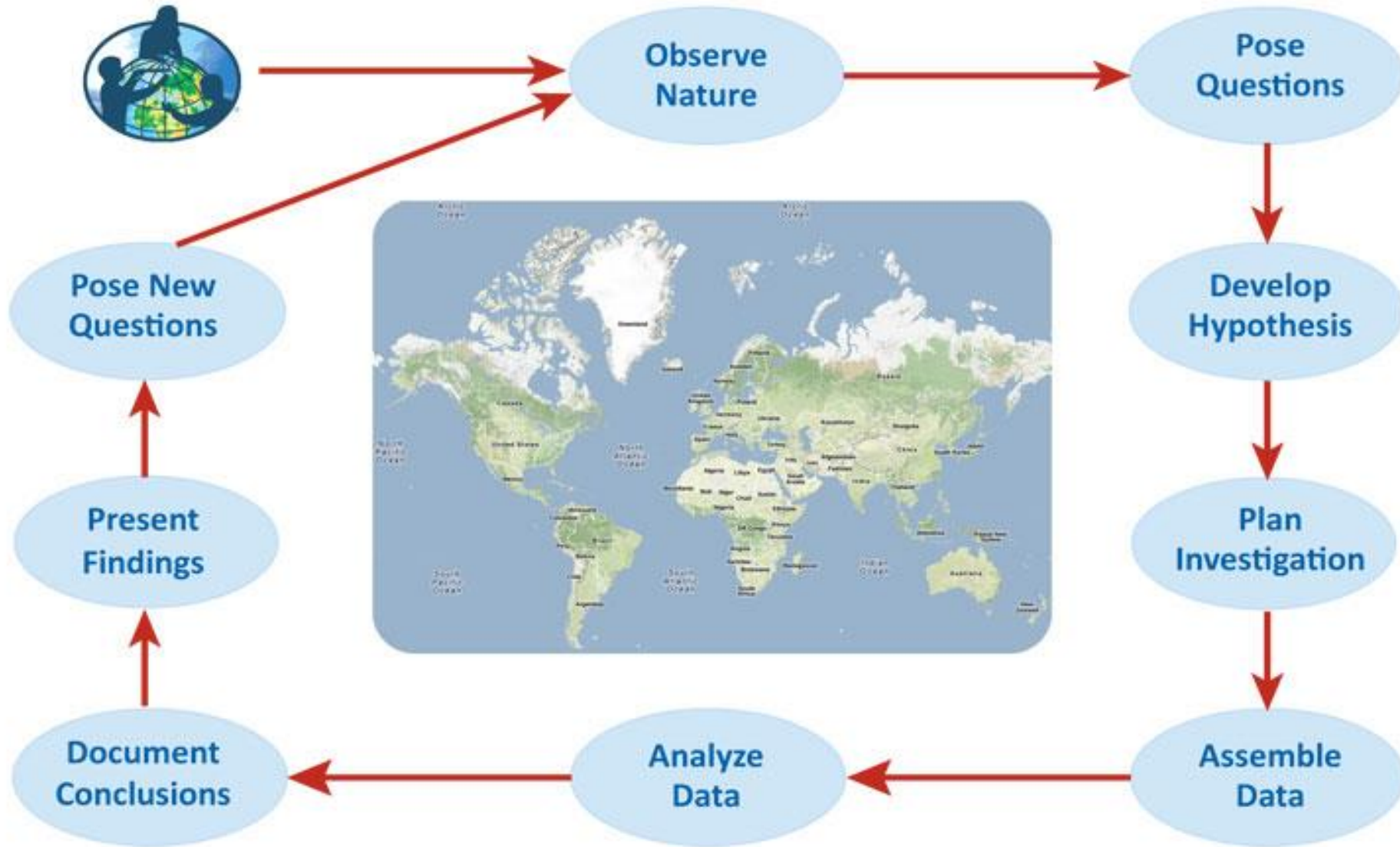
Option 1 Data already collected?

- We have some data collected in the past using hydrosphere protocol.....

Option 2 Data yet to be collected?

- We have to collect the data for IVSS project

Scientific Research Process



First thing we have to do

Framing our Research Question?

Descriptive

- When a study is designed primarily to describe what is going on or what exists

Relational

- When a study is designed to look at the relationships between two or more variables

Causal

- When a study is designed to determine whether one or more variables causes/affects one or more outcome variables

The key is

Planning

3 months

- Assign groups

10 -11

- Finalize Research question

4- 9

- Collect data

Planning

6 week

- Write Introduction
- (Obtain poster template and rubric)

5 week

- Write research method

4 week

- Analyze results

Planning

3 week

- Discussion of results

2 week

- Conclusion

1 week

- Abstract and bibliography

Required Project Elements

1. What is the generic structure of research looks like?

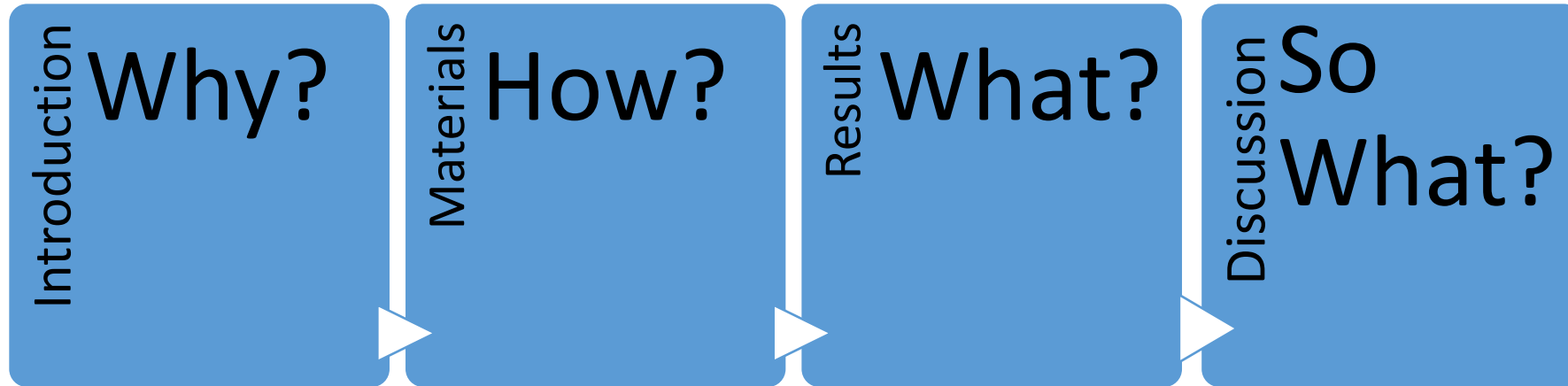
2. What are the required elements for different Grade levels?

By the end of the presentation we will be able to know:

4. Few tips to make a successful report?

3. How to apply for badges?

IMRaD



Introduction Why did we do this work

Methods How did we do?

Results What did we find?

Discussion What do the results mean?

GLOBE-Required Project elements*

Grade 6 - 8	HS - UG
Title* Abstract* Research Questions* Introduction Research Methods* Results Discussion Conclusion* Bibliography/citations	Title* Abstract* Research Questions* Introduction and review of the literature Research Methods* Results Discussion Conclusion* Bibliography/citations

Badges: Earlier



Collaboration

Interscholastic connection



Community impact

Engineering solution



Connecting to a STEM Professional



Exploring STEM Careers

Image credit: www.globe.gov

Badges: Current

OPTIONAL BADGES



I AM A COLLABORATOR

All team members are listed including students from the same school or schools from around the world, along with clearly defined roles, how these roles support one another, and descriptions of each student's contribution. The descriptions clearly indicate the advantages of the collaboration. If the students collaborated with students from another school, describe how working with other schools improved the research.



I MAKE AN IMPACT

The report clearly describes how a local issue led to the research questions or makes connections between local and global impacts. The students need to clearly describe or show how the research contributed to a positive impact on their community through making recommendations or taking action based on findings.



I AM A STEM PROFESSIONAL

The report clearly describes collaboration with a STEM professional that enhanced the research methods, contributed to improved precision, and supported more sophisticated analyses and interpretations of results.



I AM AN ENGINEER

The report uses student-generated sources of evidence to describe an engineering problem, looks at solutions through engineering, or optimizes a design to address a real-world problem, and describes the potential impact of the engineering principles on the environment.



I AM A DATA SCIENTIST

The report includes in-depth analysis of students' own data as well as other data sources. Students discuss limitations of these data, make inferences about past, present, or future events, or use data to answer questions or solve problems in the represented system. Consider data from other schools or data available from other databases.



I AM A STEM STORYTELLER

The report describes or shows how the students shared the story of their research in a creative way. This could be via a dramatic interpretation, a blog, Instagram post, artistic rendering, or any other way to creatively share what the students learned.

Image credit: www.globe.gov

Case – from Thailand

GLOBE student research data

Effects of climatic factors and containers on the number of mosquito larvae

Organization: Triam Udom Suksa School

Student(s): Ms. Chanakan Pananuruk, Ms. Kamolwan Chaisakulsurin

Grade Level: Secondary (9-12)

GLOBE Teacher: Thiparpa Srivarangkul

Contributors: Mrs. Thip-arpa Siwarangkul, Mr. Wichai Likitponrak

Assoc. Prof. Dr. Krisanadej Jaroensutasinee, Assoc. Prof. Dr. Mullica

Jaroensutasinee, Dr. Fahmida Tina

Optional Badges: Community Impact

Date Submitted: 04/03/2017

Scientist research data

Aerosol and Air Quality Research, 13: 1741–1754, 2013

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doi: 10.4209/aaqr.2012.11.0305



Temporal and Spatial Variations in Ambient Air Quality during 1996–2009 in Bangkok, Thailand

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ABSTRACT

The severe air pollution in Bangkok (BKK) is an important issue in Thailand. The Bangkok air quality and meteorological data used in this study were collected by the Pollution Control Department of the Ministry of Natural Resources and Environment, Thailand, during 1996–2009. Measurements of hourly air quality and meteorological data were derived from 10 residential and seven roadside sites. Pearson's chi-square cross tabulation statistics show that the 24-hour mean PM₁₀

Tips

Mandatory	First impression	Strength	Enhance	Smart
1	2	3	4	5
Meet the required elements	Write a perfect ABSTRACT	Present the data in tables and figures	Proof read	Emphasize for badges

Concise Title of Less Than 15 Words That Summarizes the Study

**School
Logo**

Collaboration Team Names

School Name



Abstract

- Concise (less than 200 words)
- Research context and objectives described
- Research question posed
- Methods communicated
- Results stated
- Conclusions drawn
- Include 3 to 5 key words to emphasize the big ideas

Research Question

Asking Questions

- Explains why this is an important question and of scientific interest
- Involves an aspect of Earth's environment about a local or global issue
- Considers ideas that previous investigations did not address
- Reflects in-depth knowledge of the content area
- Question is clearly stated
- Are answerable through scientific research appropriate to the scope of the report (i.e., scientifically testable)

Introduction

Content Knowledge

- Brief (300 to 500 words)
- Describes the environmental or societal problem the research question addresses
- States the importance or significance of the research; establishes relevance to a community
- Accurately uses science content and demonstrates understanding of basic scientific concepts and fundamental principles covered in the GLOBE protocols.
- A 1-2 paragraph research review demonstrating what you know already about this topic; includes 3 to 5 citations in text, including at least one primary source in a "peer-reviewed" journal.



Field Photos

(requires release forms)

Research Methods

Planning Investigations

Describes the planning process

- Includes a map and description of the study site with mention of: (1) the area of study, (2) climatic characteristics, and (3) basic aspects of land cover
- Describes the GLOBE protocols and NASA assets to be used
- Describes organization for data collection, including instrument calibration, preparation of all materials, and tools and equipment to be used
- Data collection strategy including how the time of day of data collection would be selected, how frequently data would be collected, and the timing and location of sample collection and measurement

Carrying Out Investigations

Describes what happened

- Describe the GLOBE protocols and NASA assets actually used
- Describes data collection activities including discussions of the specific locations at a site where data sampling occurred
- Describes the specifics about the data (e.g., the kinds of data, amounts of data)
- Describes the steps for data collection (e.g., frequency of sampling or measurement activities; the protocols used, the role of each team member in collecting data, etc.)

Map of Study Site(s)

GLOBE Badges

Be a Collaborator

All team members are listed including students from the same school or schools from around the world, along with clearly defined roles, how these roles support one another, and descriptions of each student's contribution. The descriptions clearly indicate the advantages of the collaboration. If the students collaborated with students from another school, describe how working with other schools improved the research.

Be a Data Scientist

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Be an Engineer

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Make an Impact

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Be a STEM Professional

The report clearly describes collaboration with a STEM professional that enhanced the research methods, contributed to improved precision, and supported more sophisticated analyses and interpretations of results.

Be a STEM Storyteller

The report describes or shows how the students shared the story of their research in a creative way. This could be via a dramatic interpretation, a blog, Instagram post, artistic rendering, or any other way to creatively share what the students learned.

Results

Analyzing Data

- Addresses the research question(s)
- Describes the procedures for data analysis including the mathematical calculations used
- Includes a detailed analysis of the data
- Tables and graphics show patterns or trends in the data
- Print screen of GLOBE visualization page

Figure #1

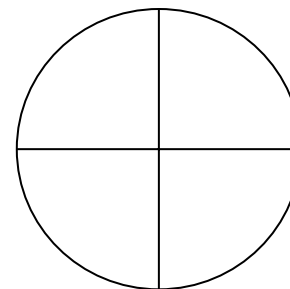
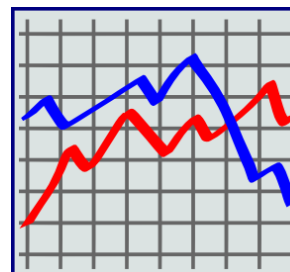


Figure #2



Discussion

Interpreting Data

- Discusses the meaning of the results
- Discusses *how and why* the results support the hypothesis or not
- Provides a description explaining the importance, relevance, and impact of the analyses, with regard to the science
- Presents a clear, complete and insightful discussion of the limitations of the methods and the data used
- Compares results with similar studies
- Suggests possible sources of error

Conclusions

Drawing Conclusions & Next Steps

- Conclusions are supported by the results
- Gives a thorough and insightful explanation as to how the conclusion was reached
- Suggests improvements in the methods
- Discusses implications for future research
- Recommends follow-up research or actions to be taken
- Discusses possible future protocols that could be used
- Describes the impact of working with a project mentor

Bibliography

References

- Cites prior literature correctly
(See owl.english.purdue.edu for guidance and resources)
- Lists GLOBE materials and NASA assets used
- Provides sources beyond those provided by GLOBE

Facilitating the Question Formulation Technique (QFT)

About This Template

Just add a Question Focus to this template to facilitate the Question Formulation Technique in your classroom or to introduce the process to colleagues.



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Source: www.rightquestion.org

The Question Formulation Technique (QFT)

Students learn to:

- **Produce** their own questions
- **Improve** their questions
- **Strategize** on how to use their questions
- **Reflect** on what they have learned and how they learned it

Rules for Producing Questions

1. Ask as many questions as you can
2. Do not stop to answer, judge, or discuss
3. Write down every question exactly as stated
4. Change any statements into questions

Producing Questions

1. Ask Questions

2. Follow the Rules

- Ask as many questions as you can.
- Do not stop to answer, judge, or discuss.
- Write down every question exactly as it was stated.
- Change any statements into questions.

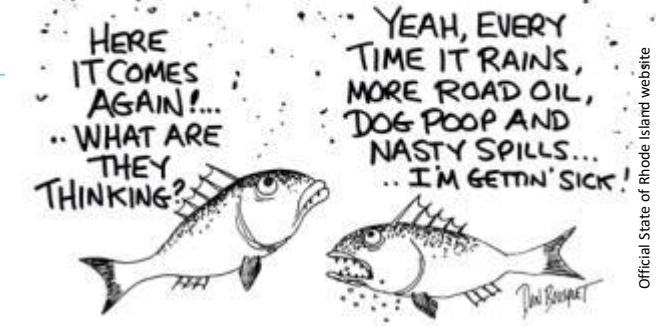
3. Number the Questions

Question Focus

Across Africa, water pollution is an ongoing issue that has a significant impact on the lives and livelihoods of many communities.

→ Please write this statement at the top of your paper.

→ Remember: Number the questions. Follow the rules.



Official State of Rhode Island website



<https://mayekoo.com/blogs/news/effects-of-water-pollution-in-africa>

Categorizing Questions: Closed/ Open

Definitions:

- **Closed-ended** questions can be answered with a “yes” or “no” or with a **one-word** answer.
- **Open-ended** questions require more **explanation**.

Directions: Identify your questions as closed-ended or open-ended by **marking them** with a “**C**” or an “**O.**”

Discussion

Closed-ended Questions

Advantages

Discussion

Open-ended Questions

Advantages

Improving Questions

- Take one **closed-ended question** and change it into an **open-ended question**.



- Take one **open-ended question** and change it into a **closed-ended question**.



Strategize: Prioritizing Questions

Review your list of questions

- Choose the three questions you consider most important.
- While prioritizing, think about your Question Focus: *Across Africa, water pollution is an ongoing issue that has a significant impact on the lives and livelihoods of many communities.*

After prioritizing consider...

- Why did you choose those three questions?
- Where are your priority questions in the sequence of your entire list of questions?

Strategize: Action Plan

From priority questions to action plan...

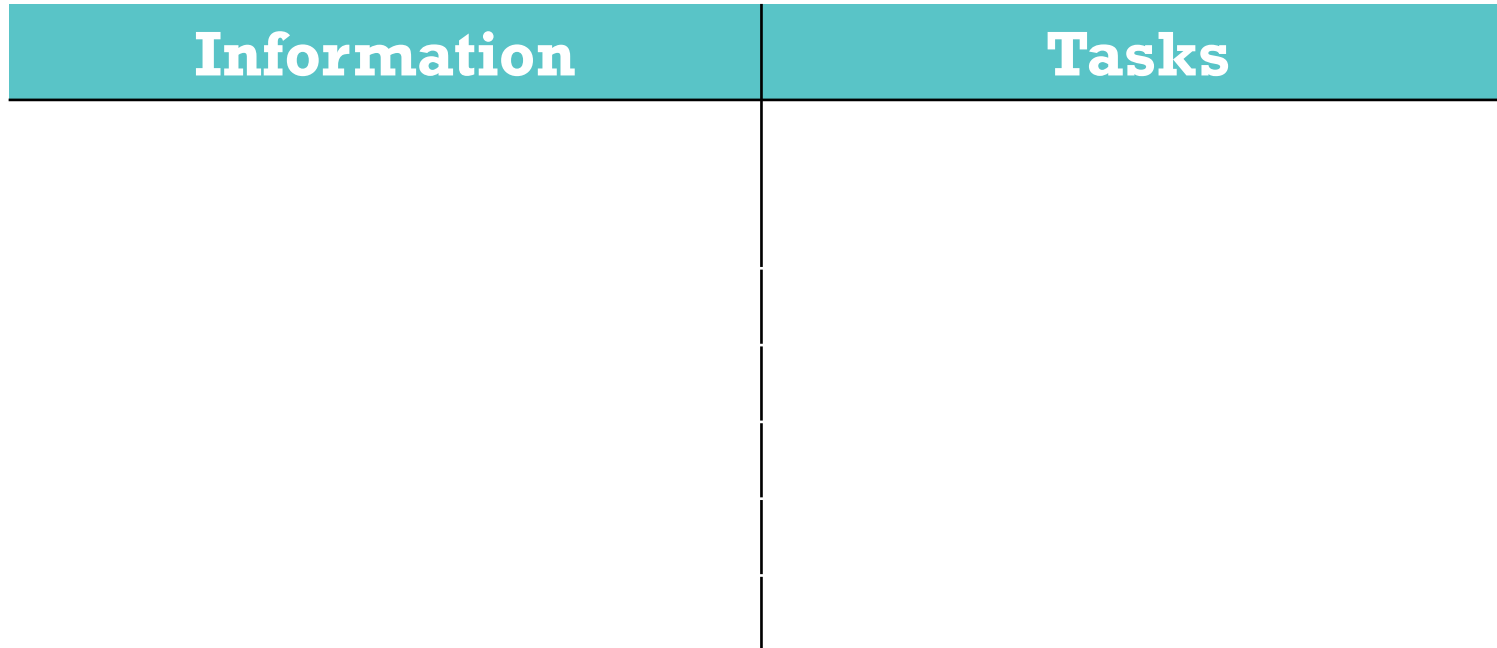
In order to answer your priority questions:

- What do you need to *know*? **Information**
- What do you need to *do*? **Tasks**

Strategize: Action Plan

In order to answer your priority questions:

- What do you need to *know*? **Information**
- What do you need to *do*? **Tasks**



Share

1. Questions you changed from open/closed
2. Your three priority questions and their numbers in your original sequence
3. Rationale for choosing priority questions
4. Next steps from your action plan

Reflection

- What did you learn?
- How did you learn it?