The doing part
Getting down to research

البحث العلمي ليس مجرد مهنة ...

البحث العلمي أسلوب حياة ...

إلى أى مدى تتفق مع هذه المقولة ؟

The doing part
Getting down to research

- Aim of the postgraduate study.
- The craft of research.
- Life in the Lab (The scientific method into action).
- Scientists : Problem solvers.
- Top 7 tips for doing research.
- Research for UG.

Aim of postgraduate studies

- **To become a fully professional researcher which means:**

1 . To have a command of what is happening in your subject .

3. To be able to discover where you can make a useful contribution.

4. To be aware of the ethics of your profession and work within them.

5. To have mastery of appropriate techniques that are currently being used, and also be aware of their limitations.

6. To acquire the craft skills of research .

7. To communicate your results effectively in the professional arena.

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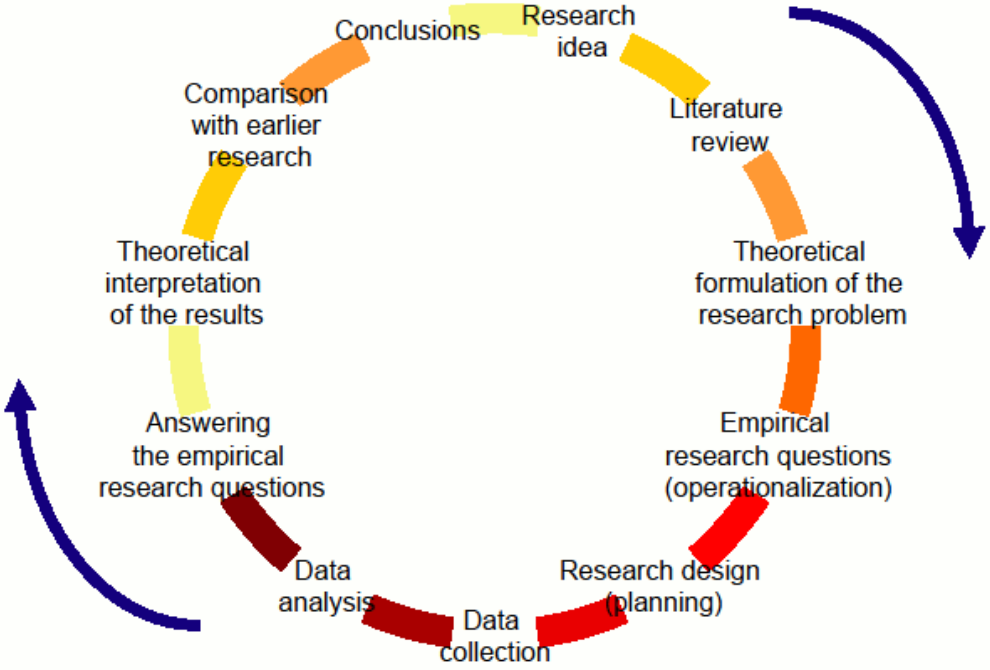
The craft of research

Research : why questions

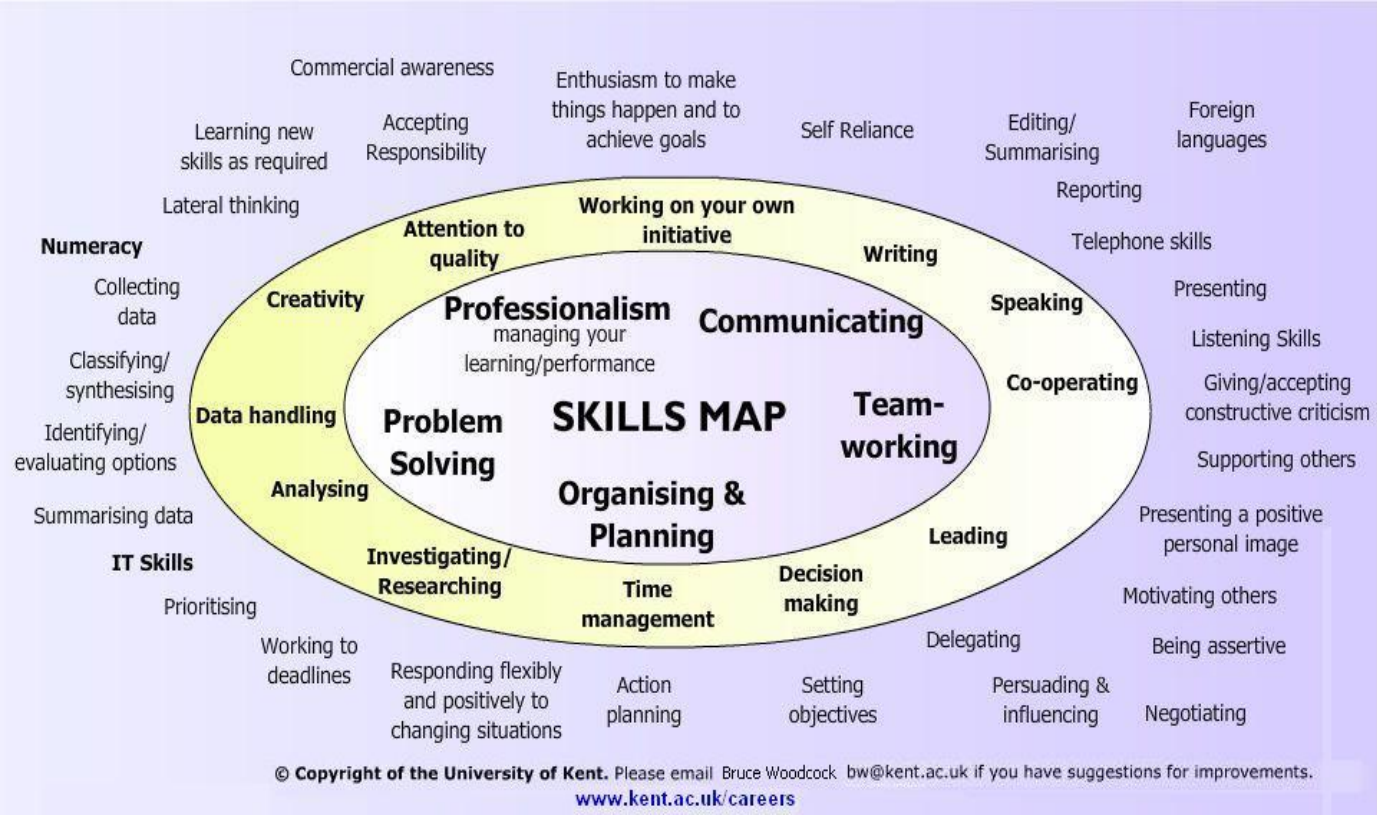
- **Research goes beyond description and requires analysis**

- **Research looks for explanations, relationships, comparisons, predictions, generalizations and theories**

The research process



Skills map for researcher



How to acquire a skill ?

1. Training :

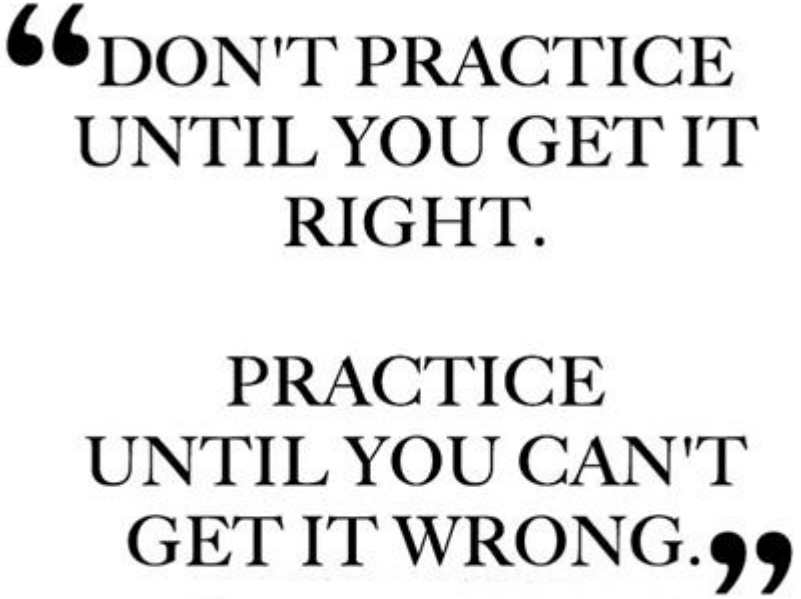
- Training Needs Analysis (TNA).
- Personal development plan

2. Practice

Practice !

Practice !

Practice!



http://youtu.be/CrAohCu2LIA

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Life in the lab

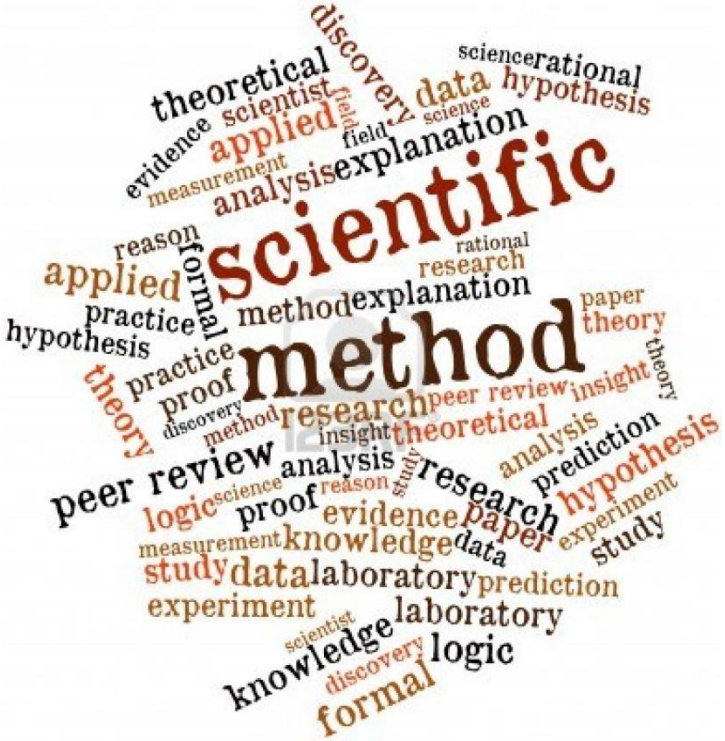
The scientific method into action

The scientific method

Definition :

- A series of steps that scientists use to answer questions and solve problems.

- There are six main steps:



The scientific method

1. Question/Observation.
2. Form Hypothesis.
3. Test Hypothesis.
4. Analyze Data.
5. Conclusion.
6. Communicate results.

1. Question/Observation

Pose a question about an observation .

2. Form Hypothesis.

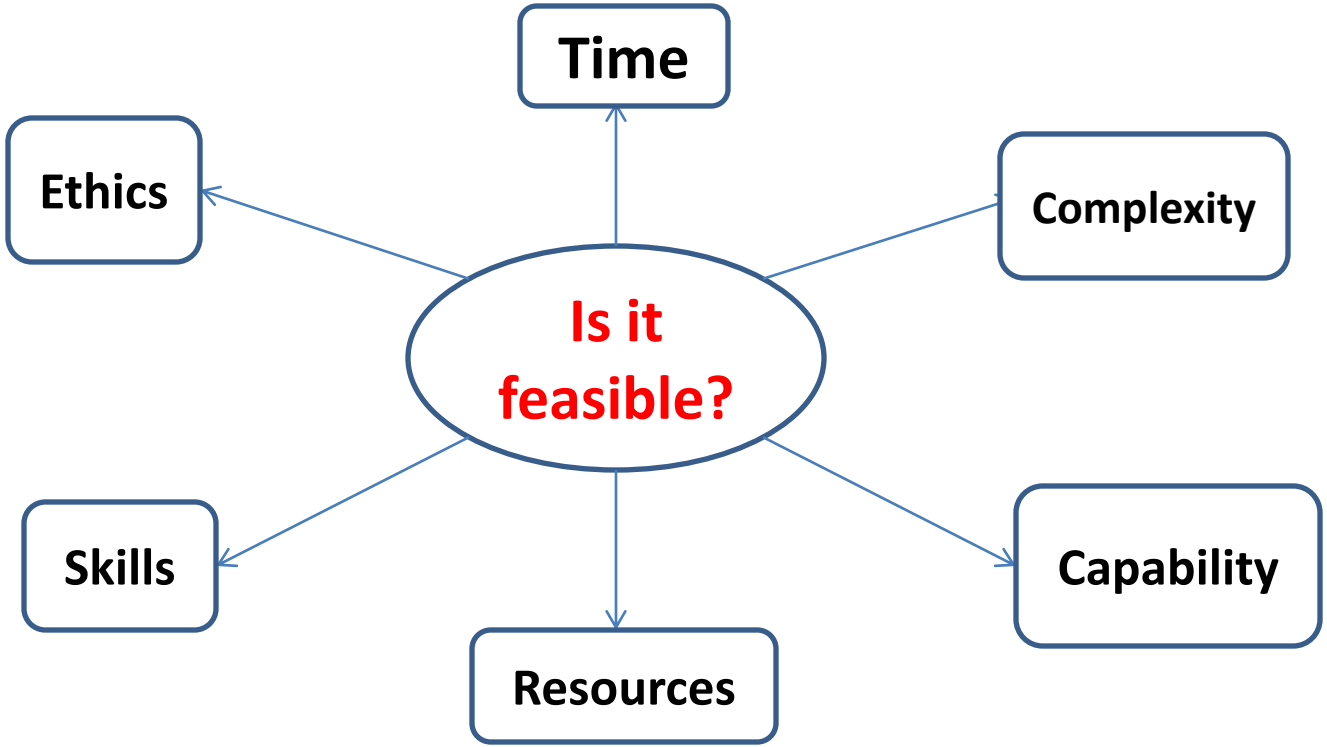
Hypothesis :

- **A possible** answer to your scientific question.
- It is not a fact.

Good hypothesis must be :

- **testable**
- **a possible answer to your scientific question .**
- **If .....then statement .**

3. Test Hypothesis.



- **Prepare for your experiment:**

1. Materials list.
2. step-by-step procedures instructions.
3. data chart , tables & observations.

Define Your Variables :

- **Variables** are anything that might impact the outcome of your study.

- **Types :**

1. Independent variables
2. Dependent variables
3. Controlled variables

- **Standardize Your Procedures**

Follow The 3 Principles of Experimental design

(1) Randomization :

Every experimental unit have the same chance.

(2) Local control :

Control of all factors except the ones about which we are investigating.

(3) Replication :

The scientific method

1. Question/Observation.
2. Form Hypothesis.
3. Test Hypothesis.
4. Analyse Data.
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4. Analyze Data

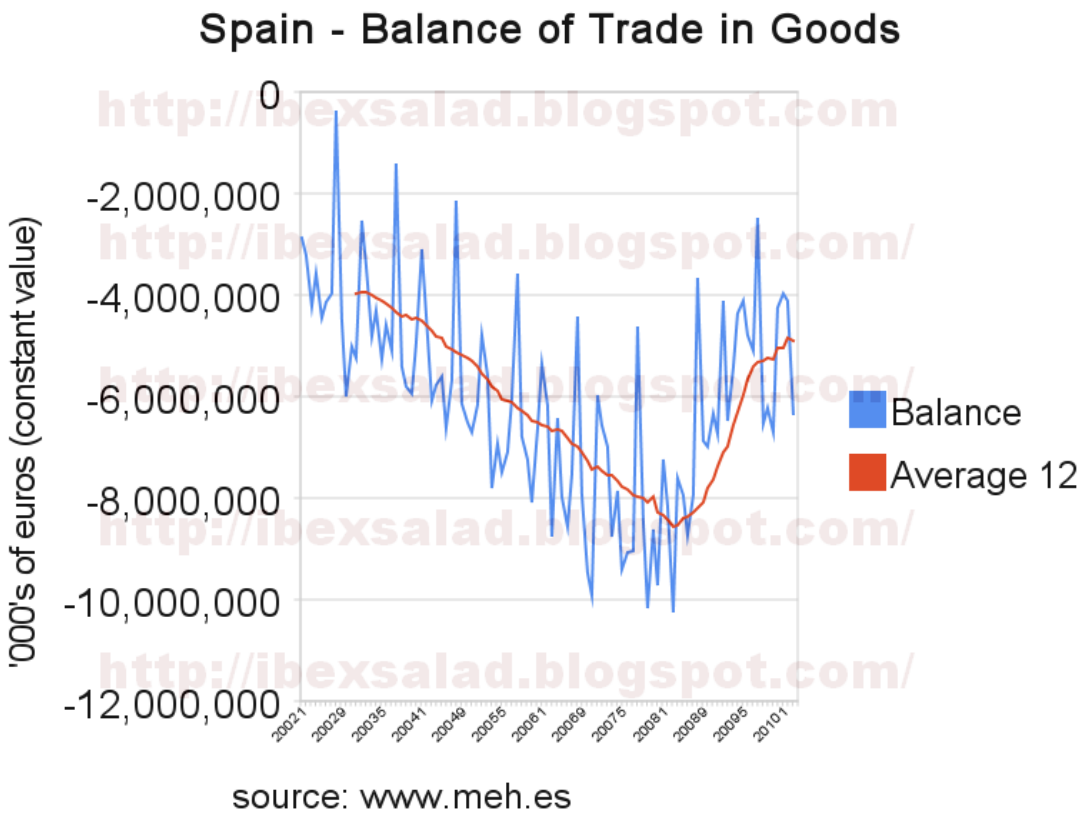
- **Data :**

Facts gathered through your observations.

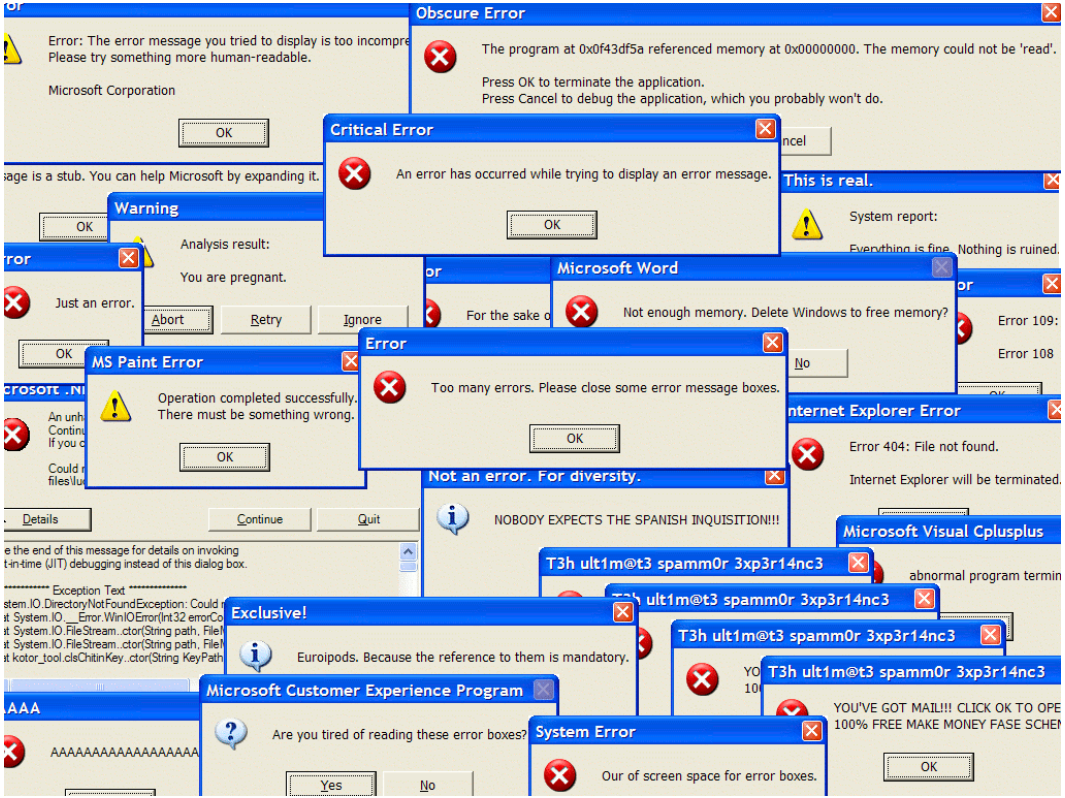
- **Analyze :**

Look for patterns.

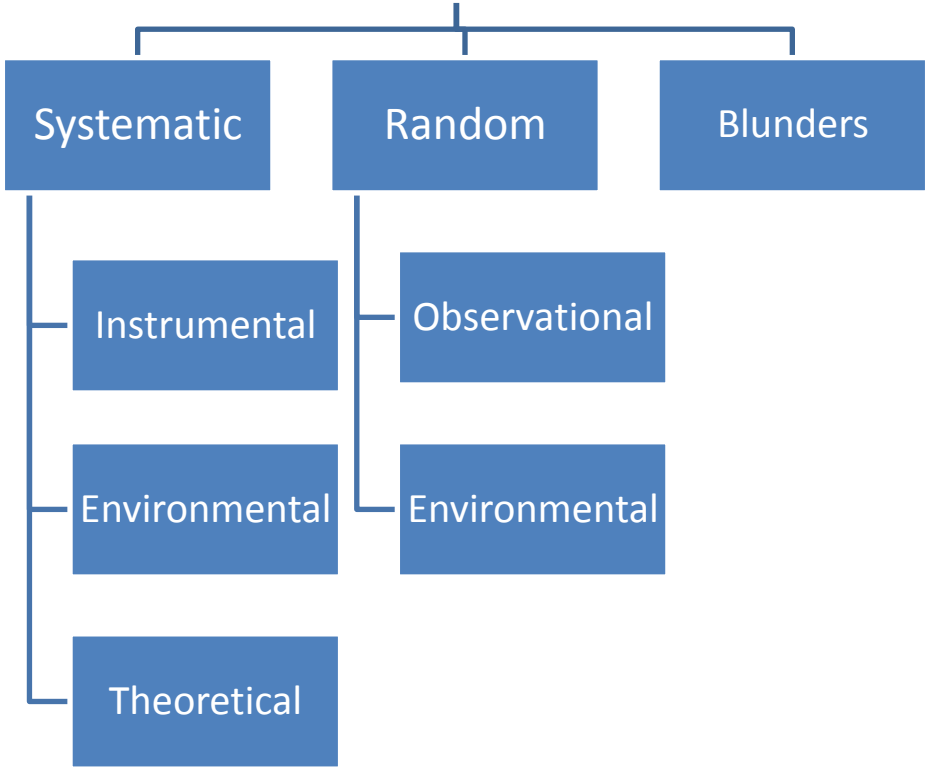
Make a picture (graph) with your collected data or write an analysis.



Errors !!!


Obscure Error
The program at 0x0f43df5a referenced memory at 0x00000000. The memory could not be 'read'.
Press OK to terminate the application.
Press Cancel to debug the application, which you probably won't do.
Critical Error
An error has occurred while trying to display an error message.
OK
Warning
Analysis result:
You are pregnant.
Abort
Retry
Ignore
This is real.
System report:
Microsoft Word
Not enough memory. Delete Windows to free memory?
No
Just an error.
Error 109:
Error 108
MS Paint Error
Operation completed successfully.
There must be something wrong.
Error
Too many errors. Please close some error message boxes.
Internet Explorer Error
Error 404: File not found.
Internet Explorer will be terminated.
Not an error. For diversity.
NOBODY EXPECTS THE SPANISH INQUISITION!!!
Microsoft Visual Cplusplus
abnormal program termin
T3h ult1m@t3 spamm0r 3xp3r14nc3
Exclusive!
Euroipods. Because the reference to them is mandatory.
Microsoft Customer Experience Program
Are you tired of reading these error boxes?
Yes
No
System Error
Our of screen space for error boxes.
YOU'VE GOT MAIL!!! CLICK OK TO OPE
100% FREE MAKE MONEY FASE SCHE
Details
Continue
Quit

Types of experimental errors



The scientific method

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4. Analyse Data.
5. Conclusion.
6. Communicate results.

5. Conclusion

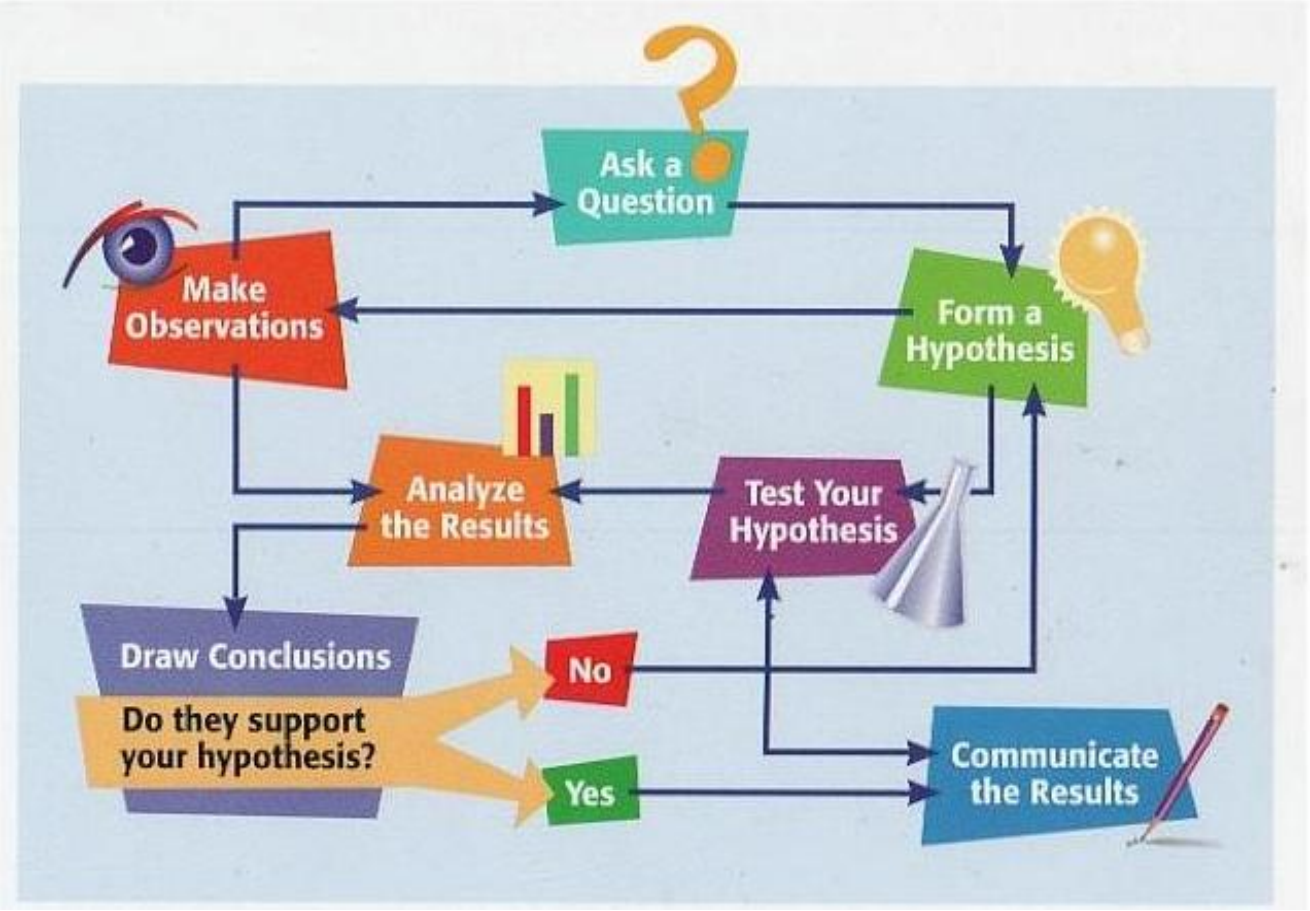
- It is a summary of what you've learnt.
- You examine your results to see if its support your hypothesis.
- If it doesn't you may need to go back fix some problems in your experiment and experiment again.

6. Communicate results

- **Sharing your ideas and results with others.**

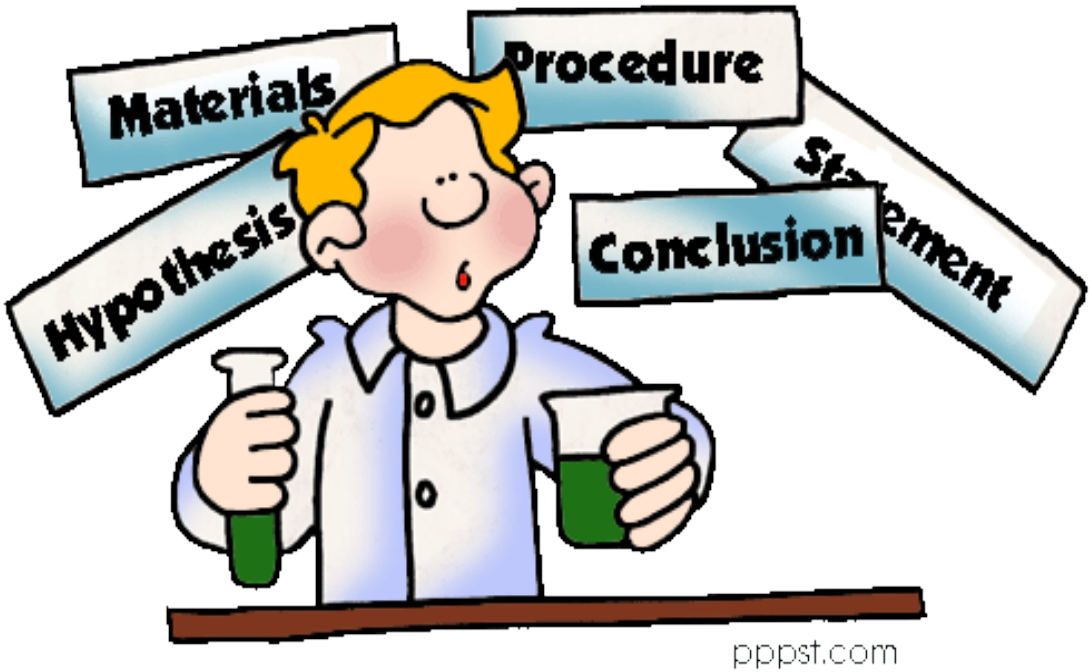
- **Describe your procedures to others so they can repeat it.**

- **Ways to communicate include :**
  - ✓ **Meetings**
  - ✓ **Scientific journals.**
  - ✓ **Internet.**

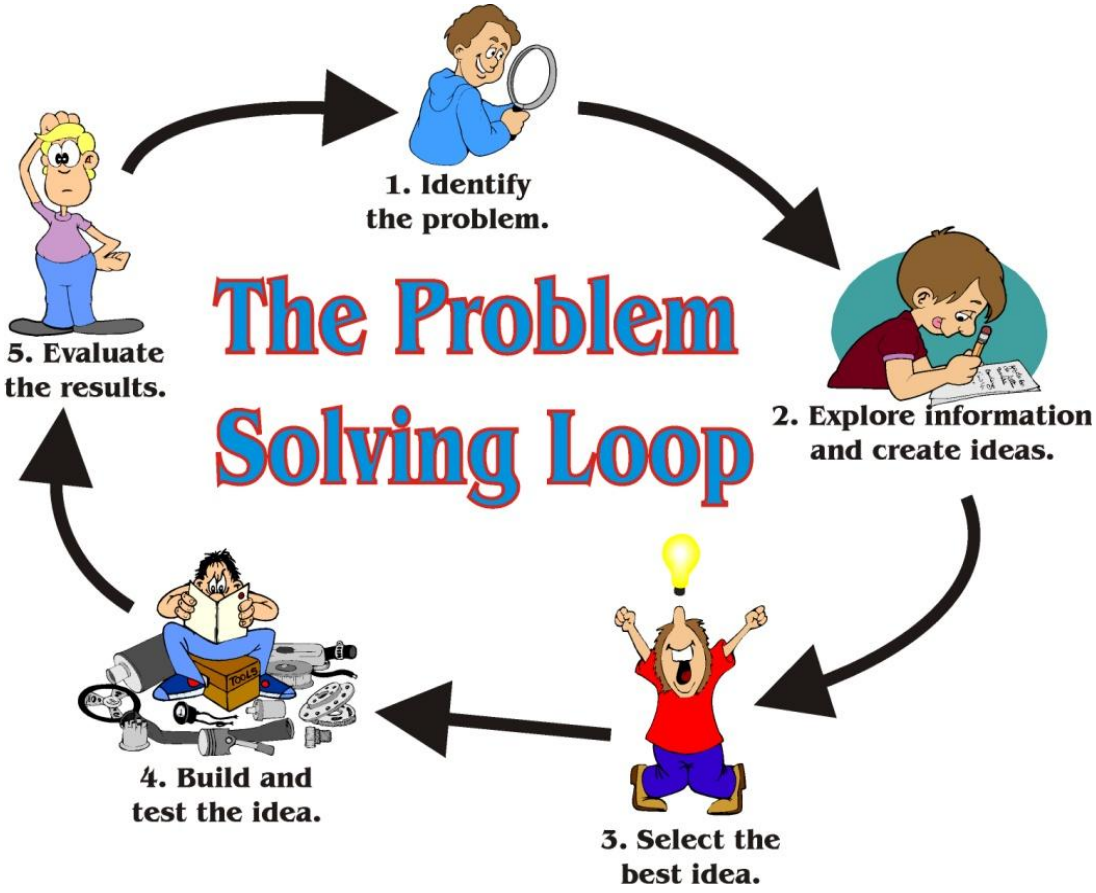

Ask a Question
Make Observations
Form a Hypothesis
Analyze the Results
Test Your Hypothesis
Draw Conclusions
Do they support your hypothesis?
No
Yes
Communicate the Results

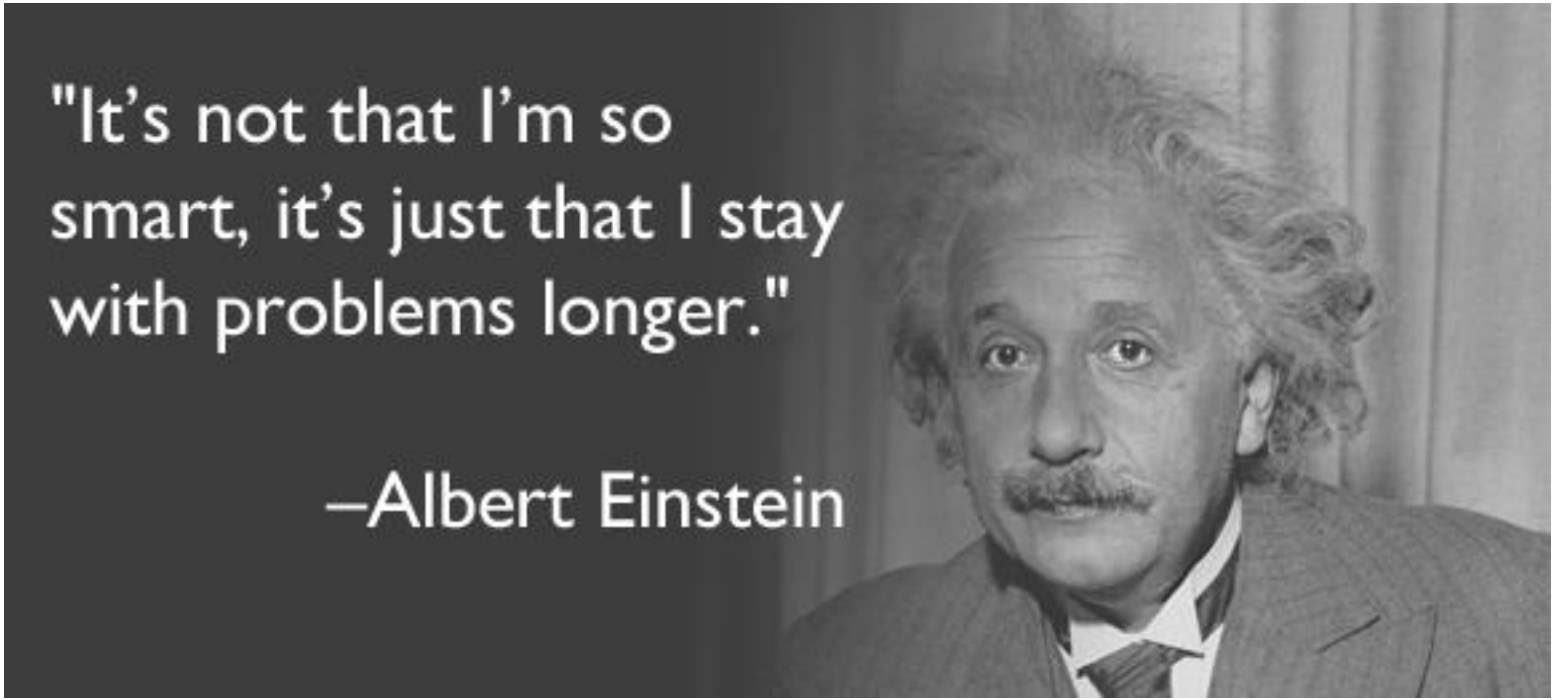
What if things go wrong ?!!


IF THINGS
GO WRONG
DON'T GO
WITH THEM
Roger Babson

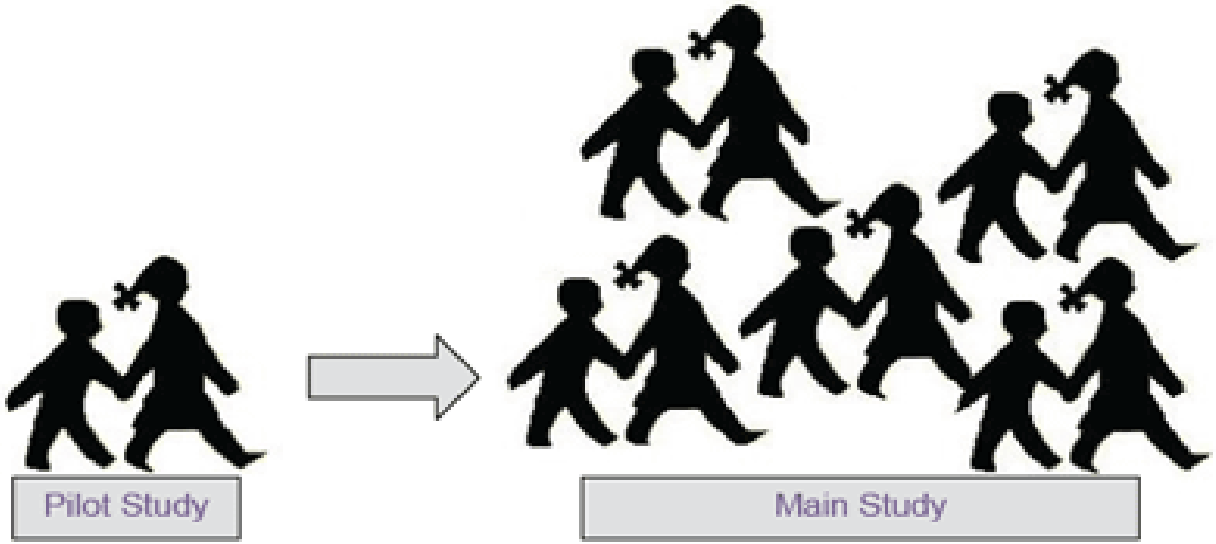

Materials
Procedure
Hypothesis
Conclusion
pppst.com

Scientists : The Problem Solvers


The Problem Solving Loop
1. Identify the problem.
2. Explore information and create ideas.
3. Select the best idea.
4. Build and test the idea.
5. Evaluate the results.


"It's not that I'm so smart, it's just that I stay with problems longer."
–Albert Einstein

Pilot study



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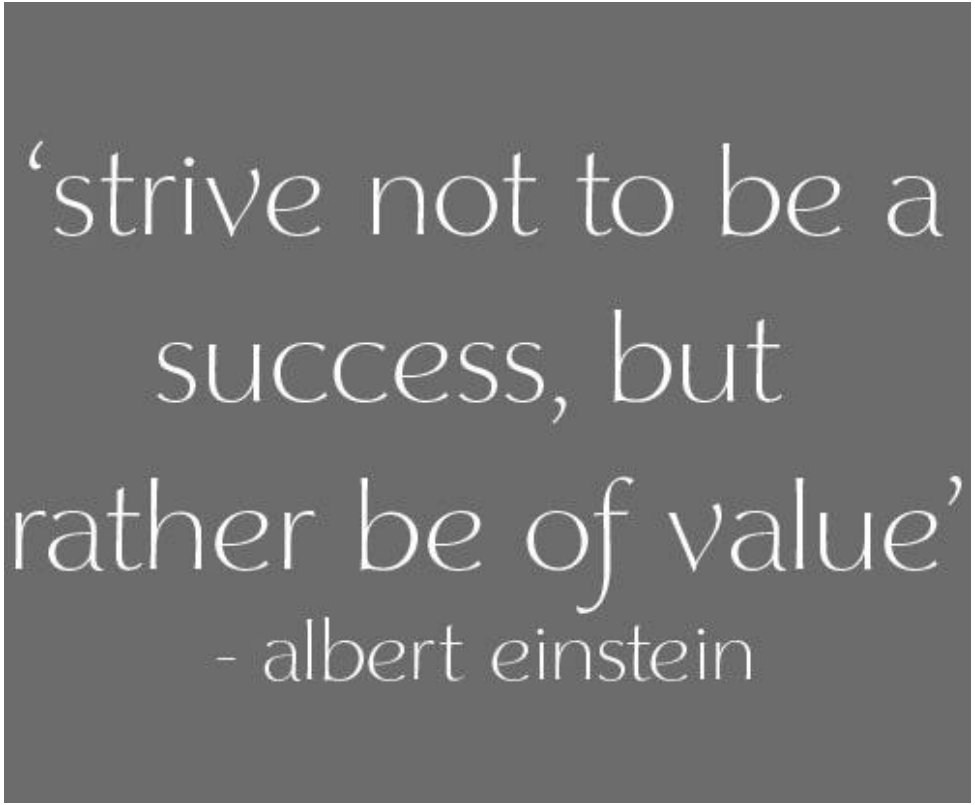
Top 7 tips for doing your research

1. Be Enthusiastic


‘strive not to be a success, but rather be of value’
- albert einstein

2.Be independent

3. Manage your time effectively

4. Be patient

5 . Don’t be frustrated

6. Keep your data safe

7. Enjoy the experience

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Research for UG

1. Establish yourself in the scientific community .
2. Make connections with faculty and staff.
3. Develop valuable skills.
4. Apply the techniques and concepts you learn in class.
5. Build a well- rounded resume.
6. Be prepared for graduate school.
7. Give you a taste of what a career in science.
8. Help you in your future career.

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517&from=fund

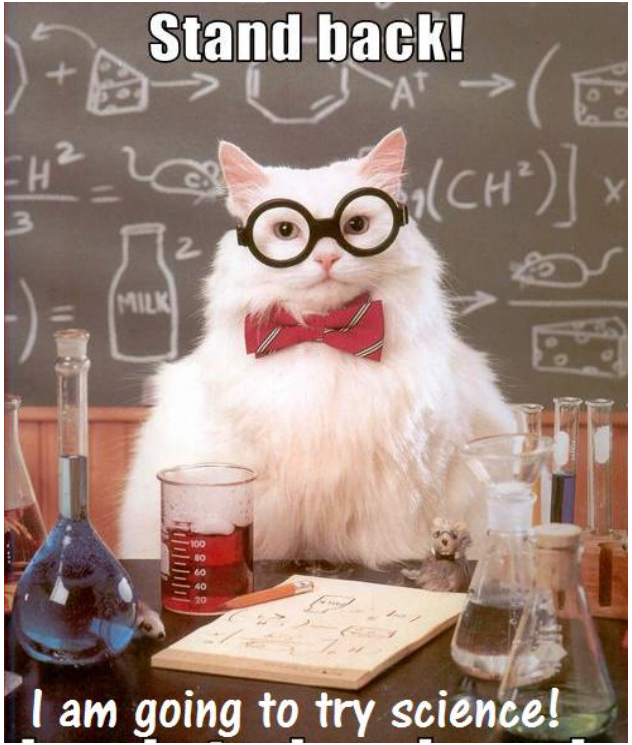
Home work ☺

Apply the scientific method a scientific experiment based on an observation in the surrounding environment .

Present it in a mind map , a video or a report .

Work individually or in groups.

Be creative ☺



Further Readings

- How to get a PhD : How to Get a PhD: A Handbook for Students and Their Supervisors by Estelle Phillips
- The craft of research by Wayne C. Booth.
- Your PhD coach : how to get the PhD experience you want by Jeff Gill author

Suggested courses

1. Language courses.
2. Project management.
3. Problem solving.
4. Time management.
5. Creativity

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Thank you ☺