1. HOW TO BECOME A RESEARCHER?

The most important skills you need to become an excellent academic researcher.

1.1. *Project Management*

- Research project requires some degree of project *management* (PM).
- What does it mean?
- PM means good *planning* [1].

- To provide a step by step *plan* of how you intend to carry this out [2].

[1] to define your research in terms of achievable ***aims***, the ***time*** and ***resources*** needed;

[2] in order to get external ***funding*** (without this skill your research project will not even get off the ground).

- How to *succeed*?
- Try to *learn* as much as possible from them you are currently working with about the details of *planning* and *running* a project.
- Set achievable *aims* and realistic estimates of *time*, *manpower* and *money* needed.
- How to *plan* research effectively?
- A research *proposal* [1] (headings), e.g.:

[1] a detailed description of the project you are going to undertake

- *Topic*: this project will study…
- *Question / problem*: to find out…
- *Significance*: so that more will be known about…
- *Primary resources*: the main data will be…
- *Secondary sources*: additional data comes from…
- *Methods*: the research will be conducted as follows…
- *Justification*: the method is most appropriate because…
- *Limitations*: there are some matters that this methodology may not help me to explain. These might include...

- *Research plan*.

  January:

- write research proposal;
- literature review;
- complete literature review and conduct pilot study;
- main data collection

  February:

- complete data collection;
- analyze data;
- begin first draft
- etc.

1.2. *Handling budgets*

https://www.debt.org/

- How to manage a budget *effectively*?
- This is necessary in order to be able to *lead* your own research project.
- You might have administrative support to help you with budget, but the *final decision-making* and *responsibility* will come down to you.
- Keeping a *regular check* on monies in and out is vital [1].

[1] keep your eyes open if things appear to be going wrong. Make sure you match your research goals to the money you have been awarded.

- Do not *spend* more money than you can afford yourself.
- But remember that the money is there to be spent [1].
- Make sure you keep good records of your *income* and *spending* [2].

[1] you can not hoard it;

[2] your university, funding body or the ‘tax man' may want to see your records at any time.

https://www.thebalancesmb.com/

1.3. *Team leading / managing*

- Good team leading is a *difficult* skill to achieve [1].
- However a research project often requires the *assistance* of others [2].
- How to *succeed*?
- Two things are important:
  - how to get the *best* out of each of your workers (1),
  - how to make their working experience a *positive* one (2).

[1] due to a large degree of autonomy in the academic world: the freedom to design and carry out organizational and financial competences and capacities;

[2] colleagues, administrative staff etc.;

- You need to be a good *communicator* [1].

- Assessing your colleague's needs and vulnerabilities /vʌln(ə)rəˈbɪlɪti/ is *essential* [2].

https://www.proofhub.com/

[1] e.g. ***asking*** each person to play their part is ***vital***, but so is ***listening*** to them, ***asking*** for their ***feedback*** on decisions or asking what is wrong if they are not happy;

[2] by doing so you will be able to lead them as a ***team***.

1.4. *Handling data* [1].

- *Data*: a *collection* of *numerical facts* regarding a particular type of info..

- Data / results you get from your project will *vary widely* [2].

- You need to be able to handle large amounts of data *efficiently* and *effectively* [3].

[1] the process of ensuring that research data is ***stored***, ***archived*** or ***disposed*** off in a safe and secure manner during and after the conclusion of a research project.

[2] e.g. ***results*** from exp. within a ***lab***, from work / observation in the ***field***, in a ***library***, etc;

[3] in a ***well-organized*** and ***competent*** way and in such a manner as to achieve a desired ***result***.

Without this skill you will never get to the exciting ***stage*** of actually ***analyzing*** your results;

efficiency is the ability to produce result in the ”best” way; ***effectiveness*** is the ability to produce a “better” result.

How to handle data *successfully*?

- You need to be well *organized* and *planning* ahead [1].
- *Lose* any work/data due to incompetence or disorganization *unacceptable* [2].

How to *avoid* it?

- design and set up your database *now*;
- organize *storage* for hard copies of raw materials and *catalogue* them clearly;
- keep *records* of who is collecting what as you go along [3], etc.

[1] even if you not exactly ***sure*** of what you will produce, you will know what sort of data storage you need (electronically and on paper), so ***organize*** this ***immediately***. Otherwise you will not able to analyze your results.

[2] it is ***wasting*** of ***time*** and ***money*** – no one can afford it;

[3] when it comes to writing up your research later, you have all the answers you need.

How to *organize* folders and files?

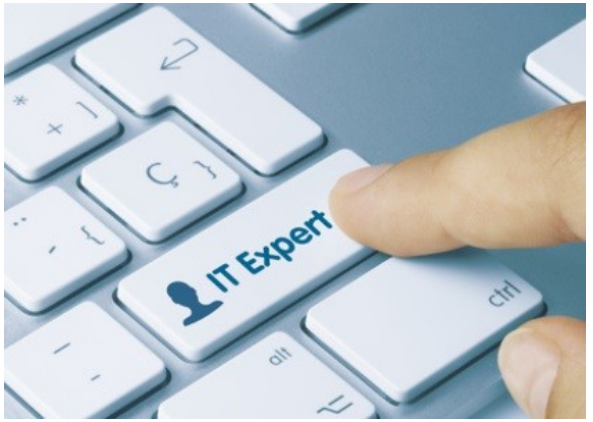
- *Systematically* managing folders:
  - saves time and effort;
  - simplifies the use (collaborative projects);
  - protects your folders and files from accidental clean-up.
- *Hierarchical* structure of folders [1]:
- Develop *standards* early in the project [2].

https://collegeinfogeek.com/file-folder-organization/

[1] structure by topic, data type etc;

[2] use these standards consistently within a project.

1.5. IT skills



https://www.hosting.com

- IT skills are *necessary*.
- When you running of your own research project it is *unlikely* you need to be an IT *expert*.
- Still, there are always new *methods* or *packages* to learn about, so don't stop [1]!
- Think how to *develop* your IT skills to present your work in a better way.
- IT never stands still, there is always a way to *improve* your skills even further.

[1] e.g. any data ***collection*** or ***storage*** ***packages*** that would help your research that you are unfamiliar with; or any ***analytical*** ***tools*** for working with large amounts of data?

1.6. What scientists do?

1. Scientists see the world *differently* than we do.

2. Scientists *analyze* problems and then make *investigations* and/or conduct exps. to discover *new* info.

3. They *order* and *explain* this info. in a synthesis by producing *theories* of how the world works.

4. *Theories* are the result of "*combination*" what we *think* [1], and what we *see* / *measure* [2].

[1] what we ***know***, our previous ***theories***;

[2] our data, obtained in e.g., ecological field exp.,vegetation survey / analysis, and to ***understand*** how theories are constructed with info. obtained by using them.

5. It takes *effort* to become *proficient* in particular techniques of investigation.

6. What is the *challenge* we face?

Theory and data are *interlinked*, and this can strongly *influence* what we find out [1].

7. This is why problem *analysis* is so *important* at the start of research.

[1] even when we think we are approaching new problems, maybe not?

https://www.tweentribune.com

1.7. *How scientists think?*

- To become a scientist you need *critical* *analysis* /*thinking* (CA/T) and *creativity*.
- CA/T: the ability to think *clearly* and *rationally*, *understanding* the logical connection between ideas [1].
- CA/T: we *must* continually apply to make definitions *exact* and *unambiguous* [2], and assessments *unbiased*.
- We *define* our ideas as a *theory* (1); *develop* new ideas from the *theory* (2); assess those ideas using measurements (3); and *redefine* the *theories* in a new synthesis.

[1] it is a process of asking questions about something, e.g.: how it looks?; how it works?; why is that so?; where is the evidence?; how good is that evidence?; is this a good argument?; is it biased? ('bīəst); is it verifiable?('vɛrɪfʌɪəb(ə)l); what are the alternative explanations?

[2] not open to more than one interpretation.

- *Creativity* (in science): the ability to *create* / *generate* new ideas and new connections between *ideas*, and *ways* to solve problems [1].

- You can be *analytic* [2] without being *critical*, but you can't be *critical* without being *analytic*.

- Ecology is an interesting, but *difficult* subject [2].

[1] an idea that is ***novel***, ***good***, and ***useful***, because you can create something which is not very useful or it just won't work well;

[2] related to analysis or analytics (separating something in into component parts);

[3] many of its valuable concepts require many ***measurements***.

Summary:

1. Scientists make *observations*.

2 . They ask *questions* about what they observe.

3. They make *predictions* about the cause (kɔːz) of the things that they observe.

4. Their *predictions* are based on *evidence* that can be *measured* and *tested*.

5. They *test* their *hypothesis*.

6. They *communicate* their *results* to their Peers.