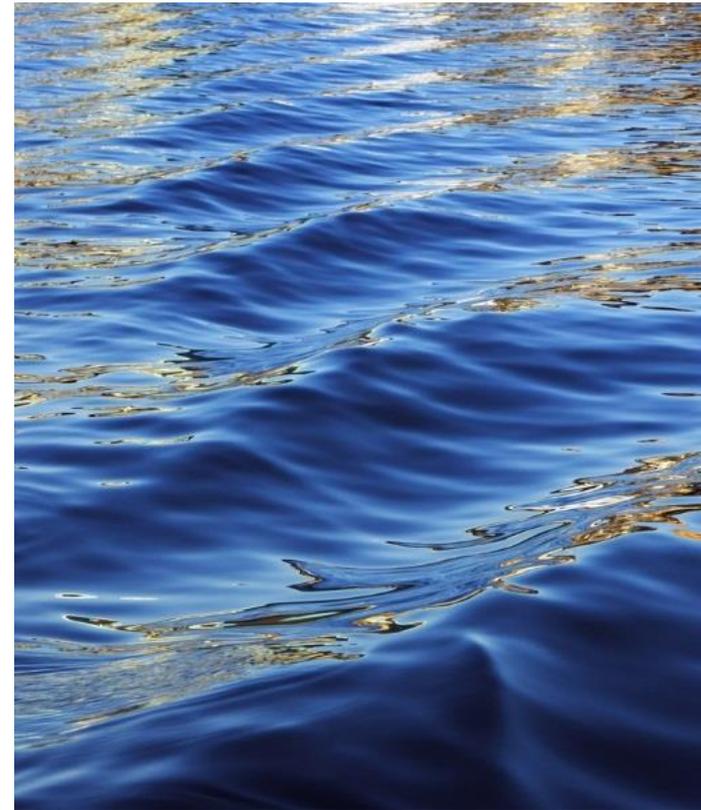




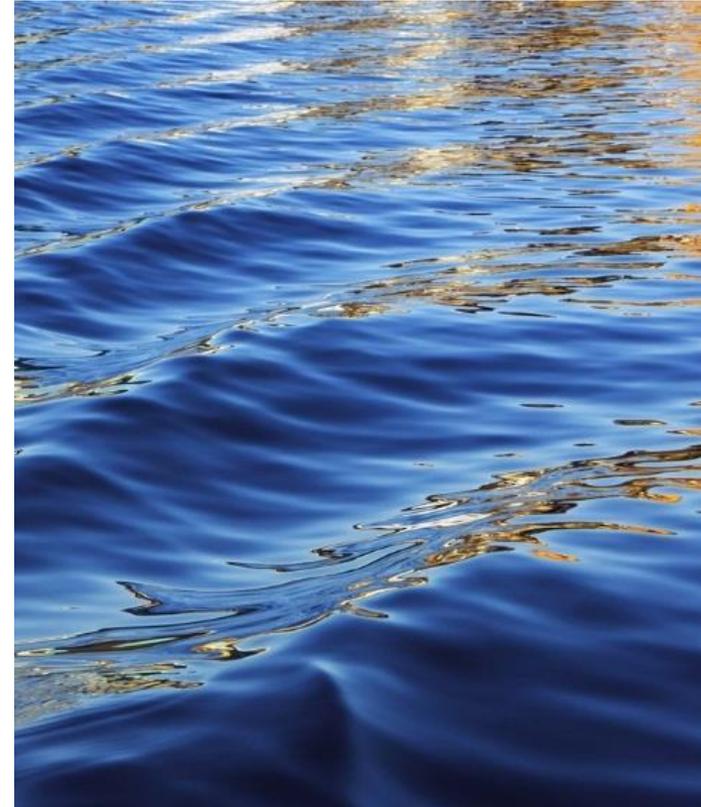
Module 2

Overall Guide to Writing an Academic Paper





The Fundamental Rules



The purpose of this module is

1. to introduce academic writing
2. to discuss the components of an academic paper

Three fundamental rules

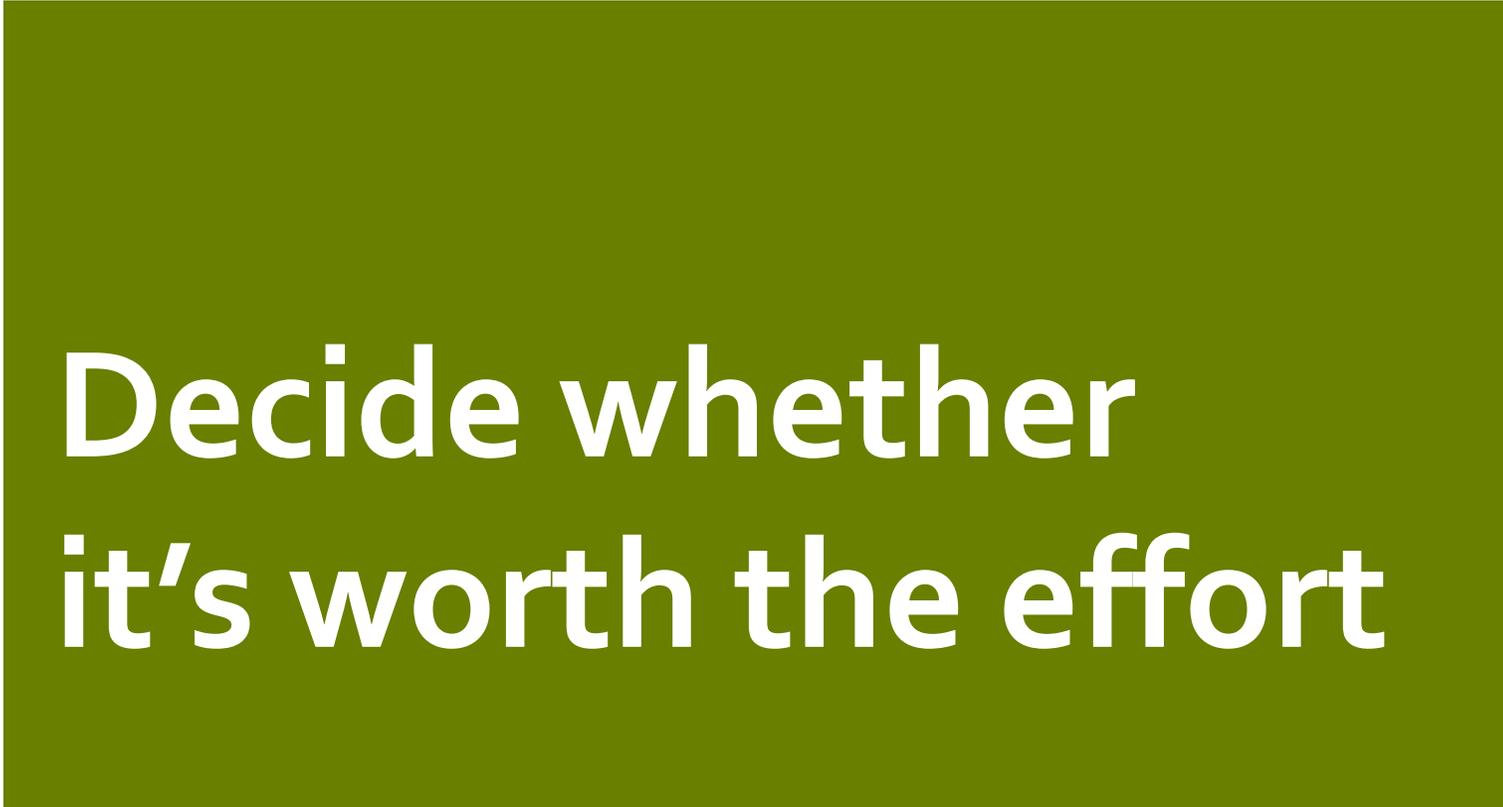
1. Identify your audience/ readers
2. Think about what it is that interests your readers
3. As you write, always keep your readers and their interests in mind.

Steps in preparing a paper

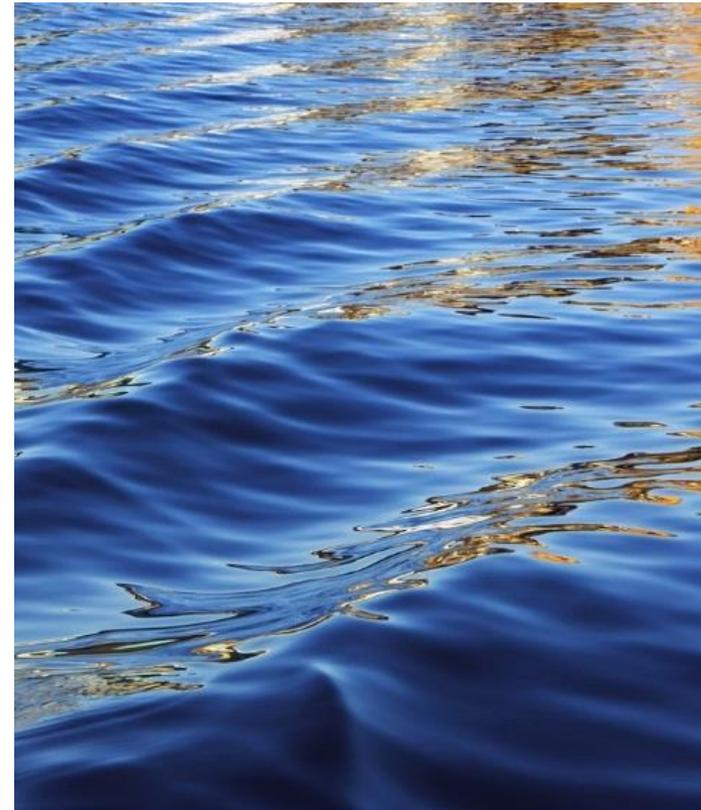
1. Decide whether it's worth the effort (include a search of the literature)
2. Organize the paper
3. Write the first draft
4. Prepare figures and tables

Steps in preparing a paper

5. Revise the draft (several times); focus on *meaning, style, and conciseness*
6. Prepare the Abstract and pick a Title
7. Conduct a final detail check for *consistency, grammar, and spelling*
8. Get a second (third, fourth) opinion!



Decide whether
it's worth the effort



Writing an academic paper that is worth the effort

Decide whether it's worth the effort. To be worth the effort, a paper should:

- a. Deal with a subject that is important to the audience/ subject/ publication
- b. Not duplicate work that has already been published

- c. Papers describing a research study should be based on explicit, measurable objectives and data that clearly address these objectives (different journals and conferences require different levels and sophistication of data analysis)

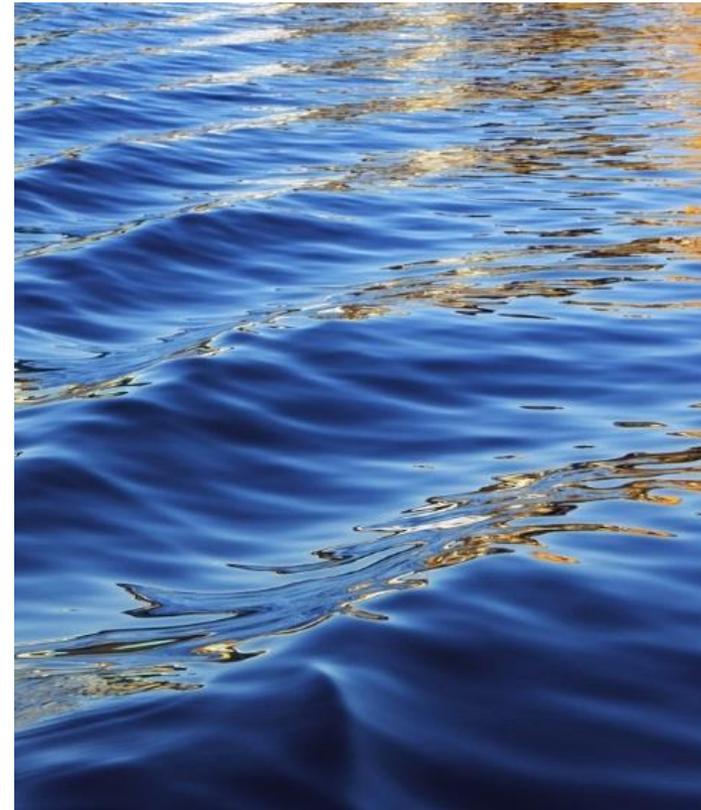
- d. Review papers should be based on careful analysis of the literature, not folklore or opinion

- e. before you begin, don't be afraid to seek advice of from YIJ's administrators, including editors and program chairs.

- f. prior publication of study like the one you are planning to conduct need not deter you *if* you can extend the work to a significantly larger sample, different types of institutions, more diverse student populations, etc



Search the literature



Literature Search

Papers on STEM are usually published in a variety of platforms, here are some examples:

- *IEEE Transactions on Engineering*
- *Proceedings of Conferences*
- Google Scholar ...
- Library (Universities/ colleges/ research institutes)

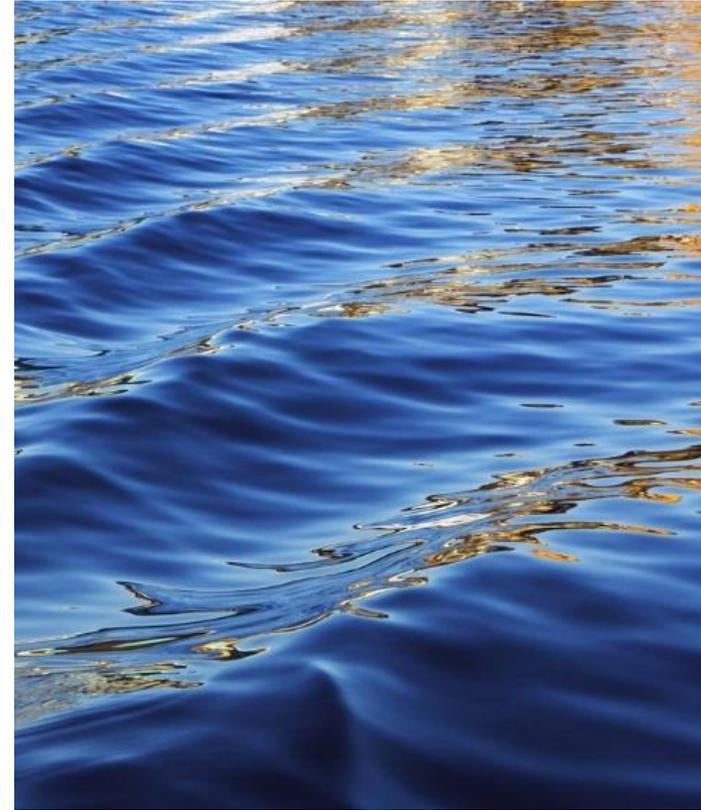
Literature Search

There are other searchable online databases available too:

- Pubmed
- Science direct
- IEEE Explore



Organize the paper



Organize the paper

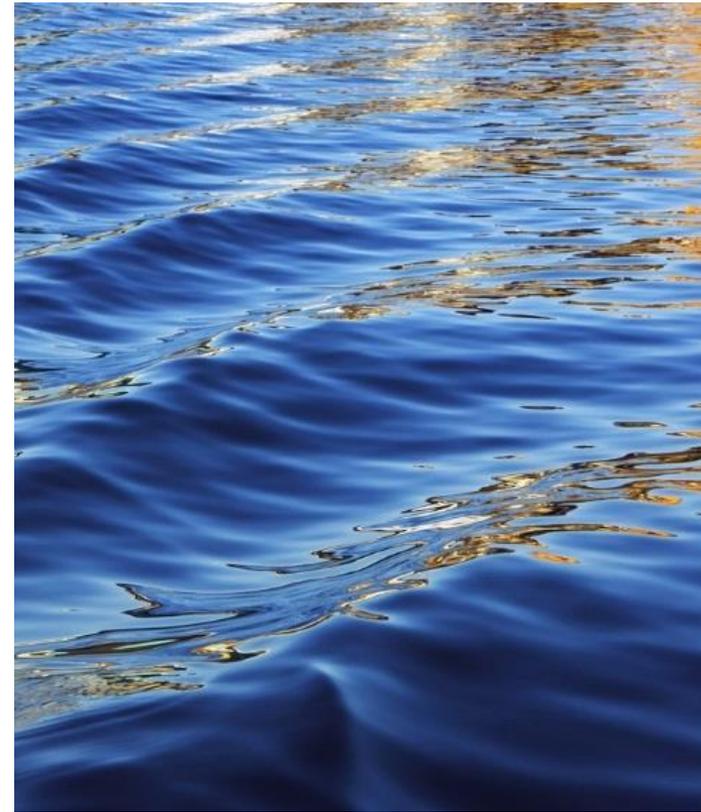
Organize the paper writing is very crucial. You require strict discipline and diligence when writing the paper. You should start with alignment, font and size, topics and subtopics:

- **Introduction:** why your subject is important *to your readers*?
- **Background:** what others have already learned about your subject (with references)?
- **Objectives:** what you expected to learn in *very specific* terms?
- **Procedure:** what have you done (experiments, invention, references, etc.) to achieve your objectives?

- **Results:** what are your findings?
- **Discussion:** Why are you getting such results? What is the significance of your result? Compare this with previous findings and cite them.
- **Conclusions:** what your results mean *for your readers?*
- **Acknowledgements:** thanks to those who helped and provided financial or any other forms of support for the work.
- **References:** listed in the *format specified by the publication to which the paper will be submitted*



Write the first draft



Write the first draft

1. Overcome “writers’ block;” it becomes less of an obstacle with practice, but for most of us it never goes away. At least with a word processor, you don’t create as much wastepaper!
2. Don’t worry too much about style and grammar; when the words start to flow, let them come! You can clean up the mess in the revision. It is easier to edit a bad paper compared to a blank paper!
3. Try to write as much as possible in a single sitting; a train of thought may be difficult to recapture after too long a break.



“Writing is may seem difficult because it forces us to clarify fuzzy ideas, fill in gaps, organize our thoughts, and express these precisely; *it is a process of discovery!*”

Notes on *Introduction*

- The *Introduction* serves to make the main point of the paper explicit.
- A useful way to focus your introductory thoughts is to conceive of the paper as an explicit answer to a question. The *Introduction* serves to state the question. The rest of the paper is trying to answer this question.

Notes on *Background*

- Unless you are writing a review paper, the *Background* section should be relatively brief and limited to discussing work that applies directly to your study.
- A problem statement can also serve as the background.
- If your work extends a prior study, state clearly the *new* contributions of your paper.

Notes on *Objectives*

Objectives must be clear, explicit, and (for research papers) measurable, e.g.:

- “to determine the effect of interactive, on-line, study aids on student test scores in an introductory electric circuits course”
- “to describe the historical development of electrical engineering education in Malaysia over the past 50 years.”

Prepare Figures & Tables

- Tables, charts, graphs *etc.* are visual aides for people to understand the message you are trying to communicate. Understand clearly what are the advantages and disadvantage of all the visual aides you are using.
- Use tables to present, in compact form, the conditions of the study, *e.g.*, the demographic distribution of student populations.

Prepare Figures & Tables

- Use tables to summarize results, *e.g.*, numbers and mean grades of students in different categories completing a course under different formats.
- Use figures to show trends over time; bar charts may be useful here, since bars can be placed side by side to compare results for different groups over time (clearer than “stacking”).

Prepare Figures & Tables

- A scatter plot may be useful in demonstrating the correlation between variables, *e.g.*, test scores vs. number of practice web assignments completed.
- Results, whether in figures or tables, should relate directly to the *objectives* of the study.
- Include statistical parameters showing significance of numerical results.

Prepare Figures & Tables

- An excellent guide to data representation is Howard Wainer, *Visual Revelations*, Springer-Verlag, New York, 1997
- Follow carefully any instructions for the applicable journal or conference proceedings.
- Figures and tables should be numbered consecutively in order of appearance (separate numbering for figures and for tables).

Prepare Figures & Tables

- Include only figures and tables that illustrate significant points in the text.
- Make captions simple but descriptive, e.g., “Table 2. Course-related differences in learning outcomes.”
- Avoid color and shading in bar charts (unless journal is printed in color); use dot and crosshatch patterns that reproduce clearly in black and white.
- Computer screen shots often reproduce very poorly!

How and when to revise your draft?

- For most of us, this is the most critical step in writing a good paper; it needs to be repeated several times with a rest in between.
- Here is where we need to pay careful attention to *meaning* (how our readers will interpret what we say), *grammar* and *style*, and *conciseness*.

How and when to revise your draft?

- Refer to a good style manual; I particularly like W. Strunk, Jr., and E. B. White, *The Elements of Style*, 4th Ed., Allyn & Bacon, 2000. (But I do use the passive voice.); others prefer C. T. Brusaw, G. J. Alred, and W. E. Oliu, *Handbook of Technical Writing*, 2nd Ed., St. Martin's Press, 1982.
- Omit needless words (*Strunk & White, Rule 17*)! For example, always edit out "the fact that."



Rule 17 is important- enough to quote:

"Vigorous writing is concise. A sentence should contain no unnecessary words, a paragraph no unnecessary sentences, for the same reason that a drawing should have no unnecessary lines and a machine no unnecessary parts. This requires not that the writer make all sentences short or avoid all detail and treat subjects only in outline, but that every word tell." (Strunk & White, p. 23)

Getting rid of needless words

Before revision

After revision

The fact that certain students failed to complete the on-line assignments resulted, in most instances, in lower scores for these individuals on the following hour test. (26 words)

Students who failed to complete the on-line assignments usually scored lower on the following hour test. (16 words)

Prepare and check carefully the list of *references*

- Follow *exactly* the format specified by the journal or conference to which you are submitting the paper.
- Normally, references are numbered in order of appearance in the text (end-note utilities in word processors do this automatically, but too often have minds of their own).

Prepare and check carefully the list of *references*

- Double-check the spelling of authors' names (dangerous error: misspelling the name of someone who might review the paper!).
- Check again for consistency!

Prepare the abstract and select a title

- After all revisions are completed, prepare an abstract that summarizes in about 250 words on what have you done (research), why you have done this, what is your findings (state the most crucial that you wish to highlight), and what it means to your readers.
- Select a title that clearly conveys your subject and keep the title short (as few words as possible).
- Remember: many will decide whether to read your paper based on the title and abstract.

Conduct a final check

- Check for **consistency**: Are you capitalizing the same terms each time? Does formatting follow the instructions for the journal or conference proceedings to which the paper will be submitted? Are tables, figures, and references numbered consecutively without gaps, etc.?
- Check for correct grammar: Do verbs agree with their subjects? (Note that *data* is a plural noun – *datum* is singular) Are you mixing tenses within a paragraph? Are you using the correct case for pronouns (*who* vs. *whom*), etc.?

Conduct a final check

- Check spelling carefully: Be on guard for errors the spell checker will miss, e.g., *affect* for *effect*, *two* for *too*, etc.
- Alternative, you may use the Grammarly®, free online writing assistant.

Get a second (third, fourth) opinion

- If possible, persuade one or two (or three) 'colleagues' or friends to read your paper and suggest improvements. (This may require buying drinks or other forms of "convincing", but the resulting paper will almost always be better than the original version!)



Here is an example of a video to help you form the basis for your search for more training materials:

<https://www.youtube.com/watch?v=Vky9PDKx5KU>

Types of Papers

There are generally 4 types of academic papers which are:

1. **Policy Paper** – A paper to deliberate system of principles to guide decisions and achieve rational outcomes
2. **Review Paper** – A compilation of many papers on a topic the review paper is focusing on
3. **Technical paper** – A research paper that describes the methodology and results of a scientific research problem
4. **Invention/Innovation paper** – A paper that describes an invention or innovation that addresses an issue.

* Please refer to other modules for more details of each types of paper.



Thank you

