Scientific Writing
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Why are we here?"

Who has published?
Introductions and expectations

• Write out 1-2 expectations and submit
• Then introduce your neighbor
  – Name
  – Institute
  – A Hobby
Who is Tom?

- PhD – Iowa State University 1971
- UC Davis Professor since 1972 (Plant biology, plant structure and development)
- Department Chair, Associate Dean, Executive Associate Dean, etc...
- Professor Emeritus since 2006
- Special Assistant – College of Agriculture and Environmental Sciences, International Programs since 2009
- Experience – curriculum development – Vietnam, Slovakia, Afghanistan, Pakistan, Myanmar ++
Who is Mark?
What is expected

• Involvement: Get involved.
  • Put more in, get more out.

• Comments & discussion
  • Brief
    – Respect
  – Not personal – focus on content not person
• Veto power
  • Instructor can call for closure – again not personal – but must keep on track.

• Break
  • Revive, refresh!

• Cell phones?

• Other?
Daily schedule

• Start? Finish?
• Breaks?
• Lunch?
Class Objectives

After going through this learning module, the participants will

• know the primary sections included in a standard scientific paper

• understand the primary content and purpose of each section, and

• have drafted (selected sections of) a Scientific paper.
Class Structure

Class activities will be conducted in the following order:

• Review the sections and order of elements in a scientific paper;

• Describe the elements included in each section of a scientific paper; and

• Summarize, practice and review the activities and key points in writing a scientific paper.
Ending and beginning

• End day 1. 5-10 minute reflection – what covered? major points learned?
• Begin day 2. Reflections on Day 1. Content and style.
• End Day 2. Evaluation and closing ceremony.
Key Concepts

Key points that should be remembered at the end of the class:

• A scientific paper follows set structures (as defined by the journal involved), and
• Each section has a clear and separate purpose.
Elements of a paper

In small groups quickly
Look at some example papers and
• identify the usual elements common to major scientific publications (e.g., Title, ....?).
• share
Common elements of a scientific paper

Do we agree?
1) Title; (with a list of Author/s);
2) Abstract (with Keywords);
3) Introduction;
4) Materials and Methods;
5) Results;
6) Discussion;

   **Note:** some papers combine “Results and Discussion”
7) Conclusion;
8) (Sometimes) Acknowledgments; and
9) Literature Cited (References).
What makes a good paper?

Discussion.

• What makes a good paper?
• What is most difficult in writing a paper?
• What is the difference between a scientific paper and the “grey” literature?
What makes good writing?

Discussion.
What makes good writing

Be simple, clear and logical

Avoid....
• unnecessary or fancy words and phrases
• Generalities (Not being specific).

See “More” in booklets.

Rewrite these examples

1. We utilized the tractor which was owned by the farmer for ploughing the fields before planting the wheat.

2. The new technology which involves drip irrigation run by a diesel motor was beneficial to the stakeholders by improving their daily livelihoods.
What makes good writing

Be simple, clear and logical

We utilized the tractor which was owned by the farmer for ploughing the fields some 2 weeks prior to the planting of the wheat crop.

The new technology which involves drip irrigation run by a diesel motor was beneficial to the stakeholders by improving their daily livelihoods.

Fields were ploughed 2 weeks before the wheat was planted.

Drip irrigation improved farmers’ livelihoods.
Defining each section or element?

In small groups, write one sentence to describe:

• Title.
  e.g., The title indicates the subject and what aspect of the subject was studied.

• Abstract
• Introduction
• Methods and Materials
• Results
• Discussion

Share your descriptions. How do they compare with.....
Why each section?

• Title
  – The title indicates the subject and what aspect of the subject was studied.

• Abstract
  – The summary of paper: The main reason for the study, the primary results, and the main conclusions

• Introduction
  – Why the study was undertaken

• Methods and Materials
  – How the study was undertaken
Why each section?

• Results
  – What was found

• Discussion
  – Why these results could be significant (what the reasons might be for the patterns found or not found)

• Conclusion
  – Was the work conclusive and/or recommended next steps.
Where do I start?

• How to actually write a paper...
• Ideas? What order would you pick?
Tom’s Order

Actual order depends on the author, but one option is:

1. Results (analyze data)
2. Materials and methods
3. Introduction
4. Discussion and conclusion
5. Abstract
6. Authorship
7. Title
8. Revisit title
1. Authorship

• How to decide who should be an author?

• In addition to the main or senior author who performed the bulk of experimentation and writing of the paper, people who actually contributed substantially during the conduct of the study and preparation of the paper are listed as co-authors.

• The order in the by-line is based on the degree of contribution of each co-author.
1. Authorship

5,154 authors – physics paper

AUTHOR INFLATION

Credit Inflation
More and more scientists are sharing credit as co-authors on research papers, with a sharp increase in reports whose author counts exceed 1,000 people.

1,400 scientific papers

Number authors
50 or more

Source: Thomson Reuters Web of Science

The Wall Street Journal, 10 August 2015
1. Authorship

For your data set, make two lists:
1. Possible Authors
2. Possible people to acknowledge

Authorship versus acknowledgments
• What’s the difference?
2. Title

What makes a good title?

Keypoint. In the title describe what is the subject and what aspect of the subject is studied.

The title should be very limited and specific - a “pithy” summary of the article's main focus.
Rate the examples:

**What** is the subject and **what aspect** of the subject was studied.

- "Renal disease susceptibility and hypertension are under independent genetic control in the fawn hooded rat"
- "Territory size in Lincoln's Sparrows (*Melospiza lincolnii*)"
- “Replacement of deciduous first premolars and dental eruption in archaeocete whales"
2. Title

Activity

• Pick a topic you are familiar with and draft a title.
  – Describe **what** is your subject and **what aspect** of the subject is studied.

• Share a few examples.
3. Results

**Keypoint.** The Results describe what was found. This section presents:

1. The **facts**—what was found in the course of this investigation, Illustrations, figure legends,
2. Detailed data—**measurements**, counts, percentages, statistics,
3. **Patterns**—usually appear in tables, figures, and graphs,
4. **Text**—drawing attention to the key data and relationships among data.
3. Results

Three rules of thumb will help you with this section:

1. present **results** clearly and logically
2. avoid **excess** writing
3. consider a one-sentence summary at the **beginning** of each paragraph, if you think it will help your reader understand your data

- **Activity.** Make a brief list of the types of data collected (e.g., weather data, soil data, plant or animal observations, yields, incomes, ....) and how it might best be presented (text, table, figure or..)
3. Results

For your data set, what are the main findings?
Materials and methods

**Key point.** Materials and Methods describe how the study was done

**Activity.** Indicate: Where the study occurred

- Make a list of the important activities and procedures – in the order they were implemented
- Don’t just cite a reference to a procedure
- **Note**
  - Any assumptions underlying the study?
  - Statistical methods used (including software programs)
5. Introduction

**Key point.** The Introduction describes *why* the study was done. Do your example as you proceed.

1. Start with two or three sentences placing your study subject in **context**.
2. Follow with a description of the **problem** and its history, including previous **research**.
3. Describe how your work addresses a **gap** in existing knowledge or ability (here's where you state why you've undertaken this study).
4. State what information your article will **address**.
5. Introduction

Develop one sentence for each of the following

1. Describe the problem area you addressed (e.g., weeds in wheat),

2. What are the objectives and knowledge gap you are addressing (e.g., new weed, new product, new cropping system)
6. Discussion and conclusion

**Key point.** The Discussion describes *why* the results could be *significant* (what the reasons might be for the patterns found or not found)

**Activity.**

- What was your study question (gap or need being addressed)?
- What do you see as the main points of interest? (make a list)
6. Discussion and conclusion

• Indicate any idea(s) that seem more important to highlight.

• Work out any logical relationships between the ideas and develop a logical flow of ideas.

• What point is most clearly made by your data?
6. Discussion and conclusion

Conclusion Key point. Was the work conclusive and/or recommended next steps. Indicate which is true for your work:

1. The findings are conclusive - research is complete,
2. There is a need for further validation of inconclusive results,
3. There is a need for further investigation based on research output gaps.
6. Discussion and conclusion

• Conclusions should be based on objectives and any recommendations are clearly stated in this section.
7. Abstract

Keypoint

The Abstract is a summary of paper, (generally 50-100 words) indicating:

1) the main reason for the study (why),
2) the primary results (What you found), and
3) the main conclusions.
7. Abstract

You can think of writing the abstract as taking one or two sentences from each of your sections

• an **introductory** sentence,
• the specific **question** addressed (1 sentence),
• The main techniques or **procedures** (when and where was it conducted, if applicable; your sample size; the specific species, proteins, genes, etc., studied), (1 sentence)
• The main **results** (2-3 sentences), and
• The main **conclusion** (1 sentence).
7. Abstract

Critique an abstract in terms of the three elements.

1) the main **reason** for the study (why),
2) the primary **results** (What you found), and
3) the main **conclusions**.

**Note:** The abstract will usually be the final piece written.
7. Now write your Abstract

Draft your abstract. The Abstract is a summary of paper,
1. an introductory (1 sentence),
2. the specific question addressed (1 sentence),
3. The main techniques or procedures (when and where was it conducted, if applicable; your sample size; the specific species, proteins, genes, etc., studied), (1 sentence)
4. The main results (2-3 sentences), and
5. The main conclusion (1 sentence).
Note on keywords - why have them?

• List **6-8** keywords (preferably arranged alphabetically).
• Keywords indicate the major subjects or concepts dealt with in the paper. Keywords in the title need not be repeated.
• Keywords can be very useful in literature searches.
8. Revisit Title

• Now look at your original title
• Want to make any changes?
• **What** is the subject and **what aspect** of the subject is studied.

*WORKING TITLE*
Debrief

- What happened yesterday?
- What did you take away?
- Have we made any progress?
**Literature Cited (References).**

- List all references cited and **follow the journals’ or publishers’ guidelines.**
- Examples of formats:
How to cite others

Note – a word on Plagiarism?

The practice of taking someone else's work or ideas and passing them off as one's own

• When is it okay to copy someone’s work?
• How is it done appropriately?

Plagiarism: the act of presenting another’s work or ideas as your own.
Today’s activities

• WRITE!!! (WE WILL ASK TO SEE YOUR PROGRESS.)
• Tea break
• Class photo
• Course evaluation
• Certificates
• Lunch / Per diem payments
Reflections

• Course reflections?

Objectives

• know the primary sections included in a standard scientific paper
• understand the primary content and purpose of each section, and
• have drafted (selected sections of) a Scientific paper.
Course evaluation

• Evaluation
Agricultural Innovation Program (AIP) for Pakistan

Closing
Award Certificates