INTRODUCTION TO SCIENTIFIC WRITING

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WHAT IS SCIENTIFIC WRITING?

- Scientific writing is a formal, objective method of communicating research findings.

- Definition (Day & Gastel, 2012):
- "Scientific writing is communication that reports new scientific findings or reviews existing results in a way that allows others to evaluate and build upon them."
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WHY IS IT IMPORTANT?

- • Disseminates new knowledge
- • Facilitates peer review and reproducibility
- • Builds credibility and academic reputation

- Example:
- Publishing in Nature or IEEE Access improves visibility and academic impact.

CHARACTERISTICS OF GOOD SCIENTIFIC WRITING

- • Clarity and precision
- • Objectivity and accuracy
- • Logical flow and coherence
- • Proper citation and referencing
- • Conciseness

- Reference:
- Gopen & Swan (1990). The science of scientific writing. American Scientist, 78(6), 550–558.

COMMON TYPES OF SCIENTIFIC WRITING

- Research Articles
- Review Papers
- Technical Reports
- Theses/Dissertations
- Conference Papers
- Grant Proposals

THE IMRAD STRUCTURE

- I – Introduction → What problem?
- M – Methods → How was it studied?
- R – Results → What was found?
- D – Discussion → What does it mean?

- Example:
- We designed an IoT-based irrigation system. The results showed 25% water efficiency improvement.

WRITING AN EFFECTIVE INTRODUCTION

- • Provide context and identify the problem
- • Explain the research gap
- • State objectives and significance

- Example:
- Climate change increases plant disease risk; this study proposes a CNN-based detection model for corn leaf diseases.

THE METHODS SECTION

- • Describe research design, materials, and procedures
- • Use past tense and passive voice
- • Ensure reproducibility

- Example:
- A dataset of 3,000 corn leaf images was collected and augmented using rotation and zoom operations.

THE RESULTS SECTION

- • Present findings objectively (no interpretation)
- • Use figures and tables
- • Report statistical analyses

- Example:
- VGG16 model achieved 95.6% accuracy, outperforming ResNet101 (92.3%).

THE DISCUSSION SECTION

- • Interpret results in context
- • Compare with prior studies
- • Explain limitations
- • Suggest future research

- Example:
- Our model improved accuracy by 3% compared to prior work (Kim et al., 2022).

THE ABSTRACT

- A concise summary (150–250 words):
- 1. Background
- 2. Objectives
- 3. Methods
- 4. Results
- 5. Conclusion

- Example:
- This study develops a CNN model for detecting corn leaf diseases achieving 95.6% accuracy.

KEYWORDS

- Use 3–6 keywords reflecting main topics.

- Example:
- Deep learning, CNN, Smart agriculture, Image classification, IoT.

WRITING STYLE & TONE

- ✅ Use third-person and past tense
- ✅ Avoid personal pronouns unless allowed
- ✅ Be consistent in terminology

- Example:
- Data were analyzed using ANOVA.

ETHICS IN SCIENTIFIC WRITING

- • Always credit others' work
- • Avoid plagiarism and fabrication
- • Obtain ethical approval for studies

- Reference:
- Committee on Publication Ethics (COPE, 2019). Ethical Guidelines for Peer Reviewers.

REFERENCING AND CITATION

- Common styles: APA, IEEE, Harvard
- Use tools: Mendeley, Zotero, EndNote

- Example (APA):
- Smith, J. (2023). Machine learning for smart farming. Journal of Agricultural AI, 12(3), 155–168.

TOOLS TO SUPPORT WRITING

- • Grammarly / Quillbot → Grammar & style
- • Turnitin / iThenticate → Plagiarism check
- • LaTeX / Overleaf → Formatting
- • Google Scholar / ResearchGate → Literature access

COMMON MISTAKES

- ❌ Plagiarism
- ❌ Poor structure
- ❌ Overly long sentences
- ❌ Missing references

- Tip: Proofread three times: grammar, logic, format.

GOOD VS. BAD EXAMPLE

- Bad: The result was very good because it had high accuracy.
- Good: The model achieved 95.6% accuracy, surpassing prior approaches by 3.2%.

EXAMPLE OF FULL IMRAD ABSTRACT

- Predicting Crop Yield Using CNN and IoT Data Integration

- Precision agriculture requires accurate crop yield prediction. This study integrates CNN-based image analysis and IoT data to estimate corn yield. The model achieved 93.2% accuracy and reduced water use by 18%.

JOURNAL FORMATTING EXAMPLE

- Section | Word Limit | Notes
- Abstract | 200 | Must summarize objective, methods, results, conclusion
- Keywords | 3–6 | Indexed for search
- References | ≥25 | ≥5 recent years

- Example Journal: IEEE Access, Scientific Reports

PRACTICAL STEPS FOR BEGINNERS

- 1. Choose target journal
- 2. Study 3–5 papers
- 3. Outline IMRaD
- 4. Write → revise → proofread
- 5. Get peer feedback

RESOURCES FOR FURTHER READING

- • Day & Gastel (2012). How to Write and Publish a Scientific Paper.
- • Cargill & O'Connor (2013). Writing Scientific Research Articles.
- • Swales & Feak (2012). Academic Writing for Graduate Students.
- • Hofmann (2014). Scientific Writing and Communication.
- • Gopen & Swan (1990). The Science of Scientific Writing.

SUMMARY

- • Scientific writing = clarity + logic + structure
- • IMRaD ensures coherence
- • Ethics and citations are essential
- • Practice improves quality

ENJOY the writing