Scientific Writing for Students

Technical or scientific writing is a type of writing that communicates scientific information and concepts in a clear, concise, and objective manner. It is used by scientists, engineers, and other professionals to report their findings, methods, and arguments to their peers and the public. Technical or scientific writing has some distinctive features that distinguish it from other types of writing, such as:

- ✓ **Precision:** using accurate and exact language to communicate scientific information.
- ✓ **Clarity:** explaining the purpose, methods, results, and implications of the study or experiment in a way that anyone can understand .
- ✓ **Formality:** avoiding slang, idioms, and figurative language and using proper punctuation and grammar to maintain professionalism.
- ✓ **Structure:** following a standard format that includes sections such as abstract, introduction, materials and methods, results, discussion, and conclusion .

One of the most common structures for technical or scientific writing is the IMRAD format. IMRAD stands for Introduction, Methods, Results, And Discussion. It is a way of organizing a scientific article that follows a logical sequence of presenting the research problem.

The choice of tense in each section of the IMRAD format is important, as it reflects the purpose and the nature of the information presented. In general, the present tense is used to describe facts, theories, concepts, and current situations. The past simple tense is used to describe actions, events, or results that occurred in the past. The present perfect tense is used to describe actions or situations that started in the past and have a connection to the present. The future tense and the past perfect tense are rarely used in scientific writing.

Here are some contexts where you might encounter the IMRAD format:

- **Research Papers:** Most scientific research papers follow the IMRAD structure to present a clear and logical flow of information.
- **Theses and Dissertations:** While the structure of theses and dissertations can vary, the IMRAD format is often adapted for the results and discussion sections.
- **Conference Papers:** Presenting research findings in a conference often involves following the IMRAD structure to convey information effectively.
- **Lab Reports:** Lab reports, particularly in the sciences, frequently adopt the IMRAD format to present experimental methods, results, and conclusions.

Understanding IMRAD and the use of tenses:

1. **Introduction :**

   In the introduction, we provide context, background information, and the main purpose of the study.

   - **Present simple** is used to describe general concepts and set the stage for the research.
   - **Past simple** is used to describe specific events or actions that happened in the past, such as previous studies, experiments, observations, or findings.
   - **Future tense** is rarely used in the introduction, but it can be used to indicate the scope or direction of the paper, to state the objectives or aims of the study, or to outline the structure or organization of the paper.

2. **Methods :**

   The methods section details the procedures, techniques, and approaches used in the study.

   - **Past simple** tense should be used to describe work and procedures done for the present study.

3. **Results :**

   Results present the outcomes of the study, including data and findings.

   - **Past simple** tense is used to describe and discuss the obtained results.
   - **Present tense** should be used to describe data that is shown in figures, graphs, and tables.

   You may therefore have sentences that combine present and past tense verbs.

4. **Discussion :**

   In the discussion section,

   - **Present tense** should be used to interpret results and to discuss the significance and conclusions of the study.
   - **Past tense** should be used to summarize the overall findings from the research.
   - **Past perfect tense** is introduced to indicate actions or situations that occurred before the study or to emphasize a contrast or change.

5. **Conclusion :**

The conclusion summarizes the key findings and insights gained from the research, reflecting on what has been accomplished and suggesting areas for further exploration.

- **Past simple** tense is used to express these reflections and insights.
- **Future tense** should be used to convey perspectives and plans.

Examples

RESEARCH PAPERS/LAB REPORTS

I. Chemical Engineering

1) Introduction:

"This part **introduces** the basics of unit operations in chemical engineering."

2) Materials and Methods:

"They **conducted** experiments to see how the distillation column **worked**."

3) Results:

"When they **looked** at how different materials **reacted** to harsh conditions, they found out some materials got **damaged** more easily than others. "

4) Discussion :

"While our results **confirmed** what others **had found** before (past perfect), our study **challenged** some old ideas that people **had believed** for a long time."

5) Conclusion :

"Our findings **gave** us ideas for further research. We **synthesized** new materials and coatings to make things stronger and better. "

II. Environmental Engineering

1) Introduction:

" Pollution **is** the deterioration of the environment due to contaminants. "

2) Materials and Methods:

"Researchers **tested** different methods to clean polluted water. They **tried** new ways to treat wastewater and make it safer for the environment."

3) Results:

"The study **found** that the use of traditional methods in wastewater treatment **was not effective** enough."

4) Discussion :

"While the results **confirmed** what others **had found** before, our study also **suggested** some new and more efficient ways to reduce soil pollution."

5) Conclusion :

"Our findings **provided** insights for further research. In the future, our research team **will explore** other innovative methods for air purification."

III. Industrial Hygiene and Safety

1) Introduction:

"Risk assessment **is** the systematic process of evaluating potential dangers in the workplace."

2) Materials and Methods:

"In a recent safety study, investigators **examined** various methods to control workplace hazards. They **tested** the effectiveness of safety protocols and **implemented** control measures to ensure a secure working environment."

3) Results :

"The results **indicated** that the implementation of safety measures significantly **reduced** workplace hazards."

4) Discussion:

"While the results **confirmed** existing knowledge about effective safety measures, our study **had** also **suggested** improvements in protocols that **were not** thoroughly **explored** before."

5) Conclusion:

"In conclusion, our study **identified** key areas for improvement in safety protocols in industrial settings."

THESES & DISSERTATIONS

1. **Abstract:**

An abstract of a dissertation is a short summary of the main points and findings of the dissertation. It usually includes the following elements:

- The purpose and scope of the research
- The methods and data used in the analysis
- The main results and conclusions of the research
- The implications and contributions of the research

"A kinetic model **was developed** (past passive) to describe the reaction mechanism and rate constants. "

"The experiments **were conducted** (past passive) in a fixed-bed microreactor using a zeolite catalyst. "

"This study investigated a new distillation process in chemical engineering and found improvements in production efficiency."

2. Introduction:

"Pollution affects air quality and water purity."

"This study has explored wastewater treatment methods."

"This study aims to fill these gaps by investigating new methods to reduce soil pollution."

3.Literature Review:

A literature review is a survey of scholarly sources on a specific topic. It provides an overview of current knowledge, allowing you to identify relevant theories, methods, and gaps in the existing research that can be later applied to a research paper, thesis, or dissertation topic.

"Environmental engineers often use advanced technologies to monitor air quality and assess pollutant impacts on human health."

"Studies have investigated the effects of different materials on soil pollution."

"Researchers conducted experiments to evaluate traditional wastewater treatment methods."

"Previous studies had assumed certain materials were resistant to corrosion, but recent findings challenged this assumption."

4. Materials and Methods:

"We conducted experiments to assess the corrosion resistance of various materials under harsh conditions."

"The engineers implemented new safety protocols because the workplace had experienced several incidents."

"This section outlines procedures used for air quality monitoring in environmental engineering studies."

5. Results:

"The analysis revealed a significant correlation between temperature and distillation efficiency."

6. Discussion:

"Results confirmed findings of previous studies."

"This section discusses implications of soil pollution on agricultural practices."

"Researchers have explored various methods to controlworkplace hazards."

"Future studies will investigate novel approaches to reduce noise pollution in industrial settings."

7. Conclusion:

"We inspected the work site and helped the workers and the company comply with the safety laws. "

"The study's findings contribute valuable insights to the field of chemical engineering."