AL-FARABI KAZAKH NATIONAL UNIVERSITY
FACULTY OF BIOLOGY AND BIOTECHNOLOGY
DEPARTMENT OF BIOTECHNOLOGY

Lecture 6

WRITING AND FORMATTING OF STUDENTS' RESEARCH WORKS

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Lecture Aim

To develop students' knowledge and practical skills in writing, structuring, and formatting scientific research papers in accordance with academic standards and ethical principles.

Expected Learning Outcomes

By the end of this lecture, students will be able to:

1. Identify the main sections and structure of a scientific research paper.
2. Describe the principles of academic writing and scientific communication.
3. Apply appropriate formatting and referencing styles in research papers.
4. Organize scientific information, tables, figures, and references correctly.
5. Recognize plagiarism and understand the importance of academic integrity.

Agenda & Structure

Presentation Overview
This presentation provides a comprehensive guide to writing and formatting scientific research papers, with a particular focus on biological and biotechnological research.

Main Topics:

- Structural and Formatting Standards
- Organization of a Scientific Research Paper
- Page Setup, Typography, and Layout Rules
- Academic Writing Style, Scientific Terminology, and Clarity
- Citations, Plagiarism Prevention, and Bibliography
- Tables, Figures, Experimental Data, and Appendices
- Practical Tasks and Core References

The Importance of Consistent Scientific Formatting

Academic formatting is essential for presenting scientific research in a clear, structured, and professional manner. It ensures consistency, readability, and scientific integrity across research disciplines.

In biological and biotechnological research, proper formatting helps researchers present experimental methods, laboratory results, tables, figures, and references accurately.

Consistent formatting also allows reviewers and readers to focus on the scientific quality and reliability of research findings.

Common Referencing Styles in Scientific Research

APA Recognizing Standard Scientific (7th Edition)

- Used in psychology, education, and interdisciplinary research.
- Uses author–date in-text citations.
- Includes a reference list arranged alphabetically.

CSE (Council of Science Editors)

- Widely used in biological and life sciences.
- Supports Name–Year and Citation–Sequence systems.
- Commonly applied in biology and related research fields.

Vancouver Style

- Frequently used in biomedical and health sciences.
- Uses numbered citations in the text.
- References are listed in numerical order.

Journal and Institutional Guidelines

- Scientific journals may have their own formatting requirements.
- Universities provide guidelines for theses and dissertations.
- Authors must follow the specific requirements of their target journal or institution.

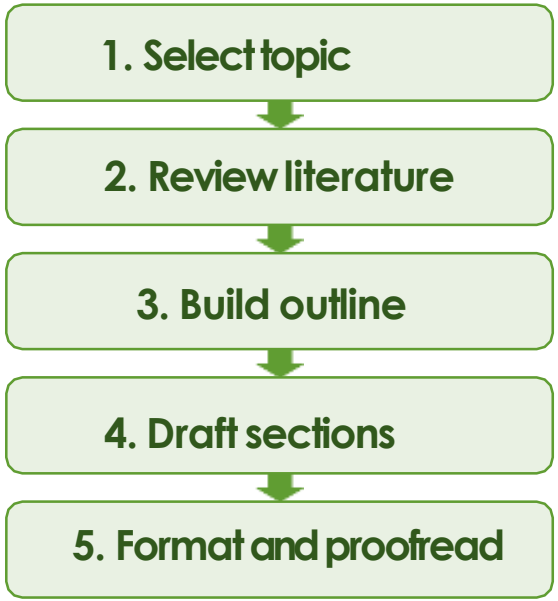
THE LIFECYCLE OF SCIENTIFIC RESEARCH PAPER DEVELOPMENT

Phase 1: Research Planning

- Topic Selection – identify a relevant biological or biotechnological research problem.
- Literature Review – search, evaluate, and organize scientific publications.
- Research Design – define objectives, hypotheses, and methodology.
- Outline Development – organize the main sections of the research paper.

Phase 2: Writing and Preparation

- Drafting – prepare the Introduction, Materials and Methods, Results, and Discussion sections.
- Data Presentation – organize experimental results using tables, figures, and graphs.
- Formatting – apply academic writing and referencing guidelines.
- Proofreading – check scientific accuracy, language, consistency, and plagiarism before submission.



Designing the Cover Page

Required Title Page Elements

- A scientific research paper cover page should include the following informatio
- Full name of the university and faculty.
- Department or research laboratory.
- Complete title of the research paper.
- Student's full name and academic program.
- Supervisor's name and academic position.
- City and year of submission.

Formatting Requirements

- Use a clear and readable academic font (e.g., Times New Roman or Arial). Center-align the main title and institutional information.
- Maintain consistent font sizes and spacing.
- Follow the university's official formatting guidelines.
- Ensure that all information is accurate and properly organized



Document layout

Summarizing the Study

Abstract: Purpose and Structure

The abstract is a concise, standalone summary of 150–250 words that captures the essence of the entire research work. It must cover four core elements: the research problem and its relevance, the methodology or approach used, the key findings or results obtained, and the main conclusions drawn. The abstract should be written in the past tense, using objective and formal academic language, and must be self-contained — readable without reference to the main text.

Keywords are listed directly below the abstract and serve as indexing terms for academic databases and search engines. Typically 5–7 terms are provided, separated by semicolons or commas. Choose specific, discipline-relevant terms that reflect the core topics, methods, and subject matter of the study. Avoid overly generic words. Keywords improve discoverability and ensure the paper reaches the appropriate scholarly audience.



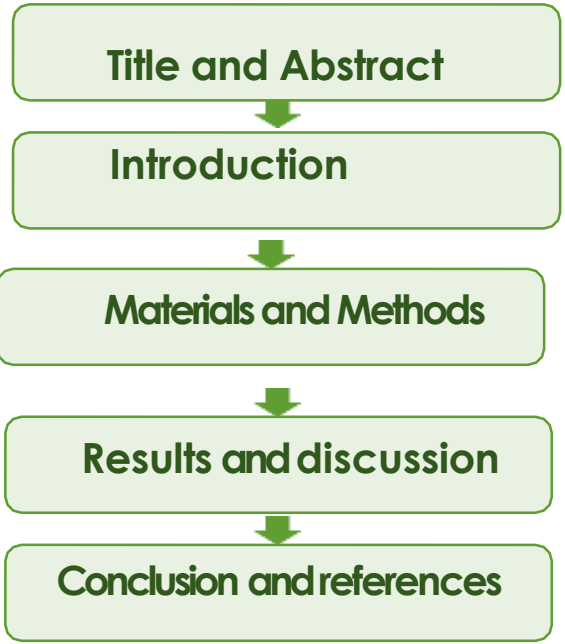
Mapping the Paper's Architecture

Organization of a Scientific Research Paper

A well-structured research paper presents scientific information in a logical and systematic manner. Most biological and biotechnological research articles follow the IMRaD structure.

The main sections include:

- Introduction: Presents the research background, problem, and objectives.
- Materials and Methods: Describes biological materials, experimental design, and analytical methods.
- Results: Presents experimental findings using tables, figures, and statistical data.
- Discussion: Interprets the results and compares them with previous studies.
- Conclusion: Summarizes the main findings and their scientific significance.
- References: Lists all sources cited in the research paper.



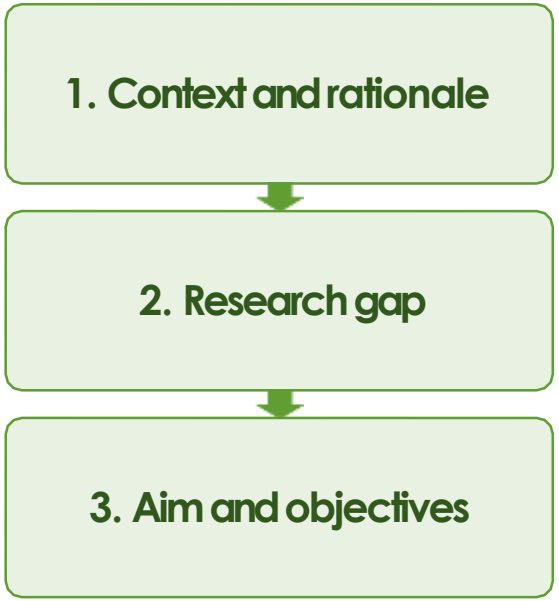
Defining the Research Scope

Research Rationale, Scope and Objectives

The introduction establishes the scientific background and rationale of a research study. It explains the importance of the research problem and identifies gaps in existing scientific knowledge.

A well-defined research scope includes:

- Research Rationale: Explains why the study is important and scientifically relevant.
- Research Gap: Identifies unanswered questions or limitations in previous studies.
- Research Aim: Defines the overall purpose of the investigation.
  Research Objectives: Specifies the main tasks required to achieve the research aim.
- Research Hypothesis: Provides a testable prediction based on existing scientific knowledge.



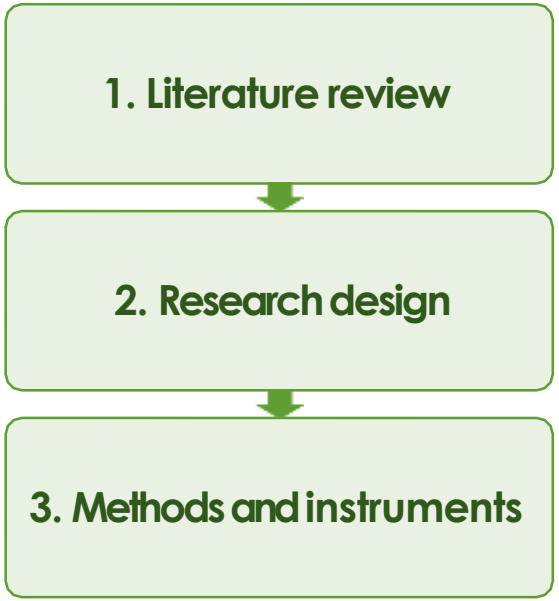
Structuring Theoretical and Empirical Frameworks

Chapter 1: Literature ReviewThe literature review summarizes previous scientific studies and identifies existing knowledge and research gaps. It provides the theoretical background for biological and biotechnological research.It includes:

1. Analysis of relevant scientific publications.
2. Comparison of previous research findings.
3. Identification of research gaps.
4. Development of the scientific rationale.

Chapter 2: Materials and MethodsThis section describes how the research was conducted and provides sufficient information for reproducibility.It includes:

1. Biological materials and experimental conditions.
2. Research design and sampling procedures.
3. Laboratory and analytical methods.
4. Data collection and statistical analysis.



Presenting Findings and Analytical Insights

Results: Data Synthesis

Present experimental findings using tables, graphs, and statistical analysis. Organize data clearly and highlight key results.

Discussion: Comparative Analysis

Interpret the results in relation to research objectives and hypotheses. Compare findings with previous studies and explain similarities or differences.

Key elements:

1. Present research results
2. Interpret findings
3. Compare with previous studies



Closing the Research Narrative

Conclusion Section Functions

The conclusion summarizes the main research findings and evaluates whether the study objectives were achieved.

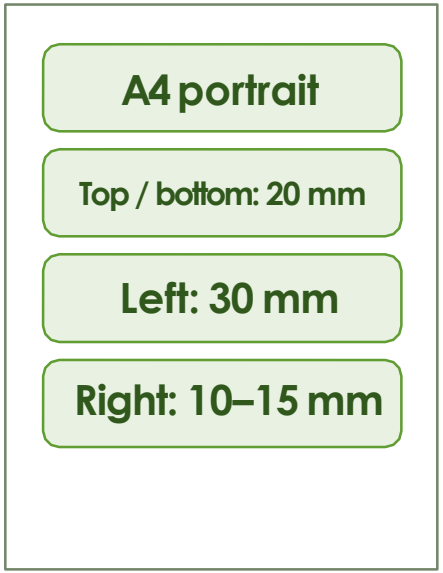
It highlights scientific contributions, acknowledges research limitations, and suggests directions for future studies.



Standard Physical Page Metrics

Page Setup & Margins Use A4 paper in portrait orientation. Required margins: Left —30 mm (binding side), Right —10– 15 mm, Top —20 mm, Bottom —20 mm. Consistent margins ensure uniform appearance and compliance with binding requirements across all submitted pages.

Spacing, Indent & Alignment Line spacing: 1.5 lines throughout the body text (or double-spaced per faculty guidelines). Paragraph first-line indentation: 1.25 cm. Text alignment: fully justified across all body paragraphs. Apply these settings uniformly from introduction through conclusion.



Document layout

FONT SELECTION AND STANDARDIZED FONT SIZES

Recommended Academic Fonts

Font Size Hierarchy

Use conservative, highly readable fonts throughout your paper. Accepted typefaces include Times New Roman (traditional, serif), Arial (clean, sans-serif), and Calibri (modern, screen-friendly). Consistency is essential — do not mix font families within a single document.

Chapter Titles: Bold, 16 pt, uppercase or title case, centered. Sub-headings: Bold, 14 pt, title case, left-aligned or indented. Body Text: Regular weight, 12–14 pt, fully justified. Captions and footnotes: 10–11 pt. Maintain this hierarchy consistently across all sections.

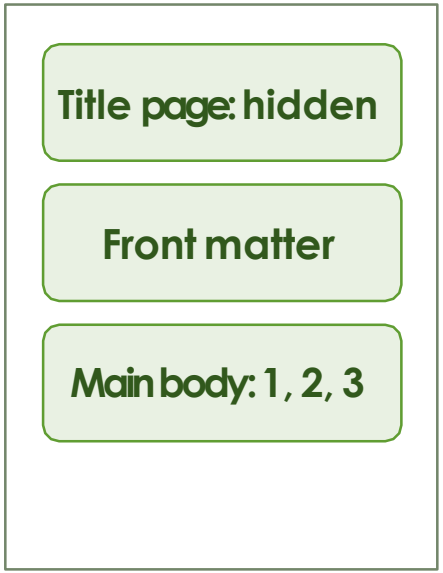
Element	Recommended size
Chapter title	Bold, 16 pt; centered
Subheading	Bold, 14 pt; left-aligned
Body text	Regular, 12–14 pt; justified
Caption / footnote	10–11 pt

Numbering Protocols Across Sections

Page Number Placement & Visibility Rules Section Breaks and Continuous Numbering

Page numbers are placed in the header (top-right) or footer (bottom-center) using the document's header/footer field. The title page counts as Page 1 but the number is not displayed. Numbering remains hidden on all preliminary pages (abstract, table of contents) and becomes visible starting from the Introduction or TOC, depending on institutional guidelines.

Use section breaks in your word processor to separate preliminary pages from the main body. Apply "Different First Page" and "Link to Previous" settings carefully to control where numbering appears. Arabic numerals (1, 2, 3) are used for the main body; Roman numerals (i, ii, iii) may be used for front matter per some style guides.

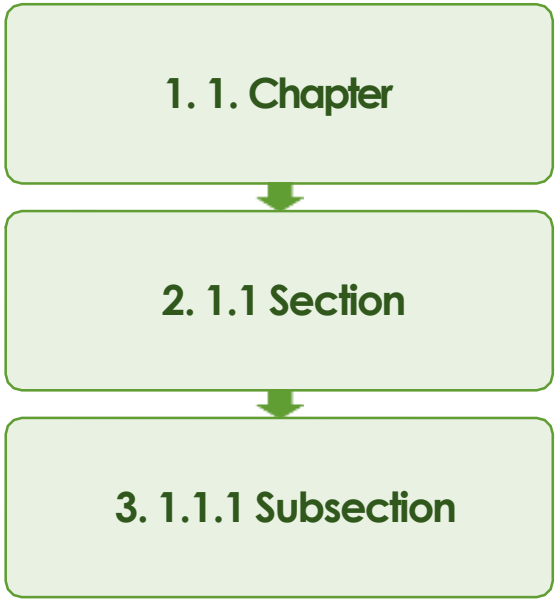


Document layout

Organizing Text Hierarchy

Headings and Sub-Headings Formatting

Use multi-level decimal numbering to organize content (e.g., 1.1, 1.2, 1.2.1). Each heading must be descriptive and clearly reflect the section content. Chapter titles are numbered at the first level; subsections follow with second and third-level numbers. Headings must never appear as orphans at the bottom of a page—always ensure at least two lines of body text follow a heading before a page break. Consistent heading hierarchy improves navigation, readability, and compliance with academic submission standards.



Adopting a Scholarly Voice

Tone & Objectivity What to Avoid

Academic writing demands a formal, precise, and objective tone throughout. All claims must be grounded in evidence or supported by citations from credible sources. The author's personal opinions should be expressed through reasoned argument, not subjective language. Clarity and conciseness are essential: every sentence must serve the argument.



Avoid colloquialisms, slang, contractions, and filler phrases (e.g., "a lot of," "things," "basically"). Do not use first-person statements of personal belief without evidential support. Emotional or sensational language undermines scholarly credibility. Replace vague terms with precise, discipline-specific vocabulary at all times.

Navigating Person Perspective

Academic Voice: Active vs. Passive

Traditional Writing

Passive voice emphasizes objectivity.*

Focuses on research findings.

Modern APA Style (7th Edition)

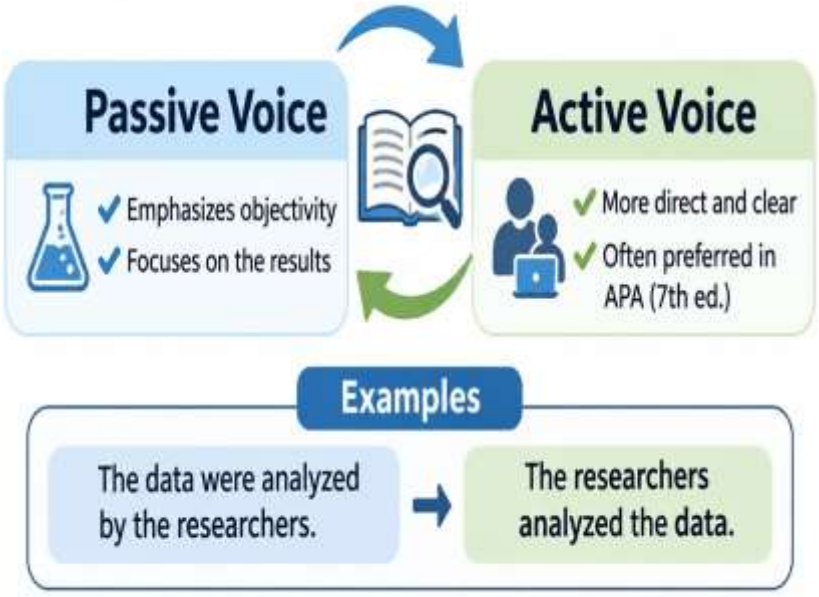
Encourages active voice.

Improves clarity and readability.

Examples:

Passive: The data were analyzed by researchers.

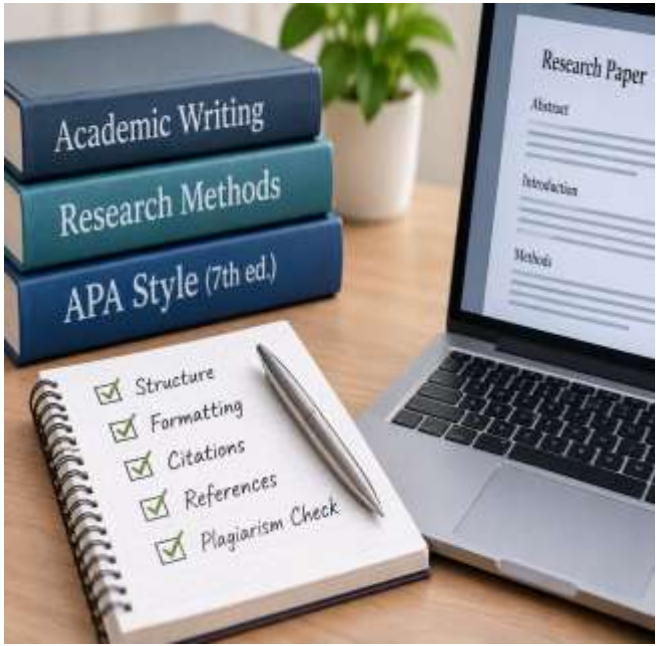
Active: The researchers analyzed the data.



Managing Technical Language and Acronyms

Scientific Terminology & Abbreviations

Introduce every technical term in full on its first appearance, immediately followed by its abbreviation in parentheses—e.g., Polymerase Chain Reaction (PCR). From that point forward, use only the acronym. Maintain a consistent abbreviation list and avoid introducing new acronyms without prior definition. This practice ensures clarity, accessibility, and precision throughout the research paper.



Formatting Quantities and Units

Rules for Writing Numbers SI Units and Spacing Standards

Spell out numbers one through nine in full within the text (e.g., "three participants", "seven sources"). Use numerals for 10 and above (e.g., 15 respondents, 42 samples). Always use numerals before units of measurement, regardless of value (e.g., 5 mm, 3 kg).

Follow SI (International System of Units) conventions: place a single space between the numeral and the unit symbol (e.g., 12 kg, 37 °C, 500 mL). Do not use periods after unit symbols unless at the end of a sentence. Use standard SI abbreviations consistently throughout the document.



Giving Credit and Supporting Claims

In-Text Citation Purpose

Citation Format Examples

In-text citations are brief pointers embedded within the body of the text that link each claim or borrowed idea to its full bibliographic entry in the reference list. They enable readers to verify sources, uphold academic integrity, and distinguish the author's original ideas from external contributions.

Author-date (APA): (Smith, 2022, p. 45) —placed after the cited statement. Numeric brackets (IEEE): [1], [2] — ordered by first appearance. Footnotes (Chicago): superscript number[1] linked to a note at the page bottom with full source details.

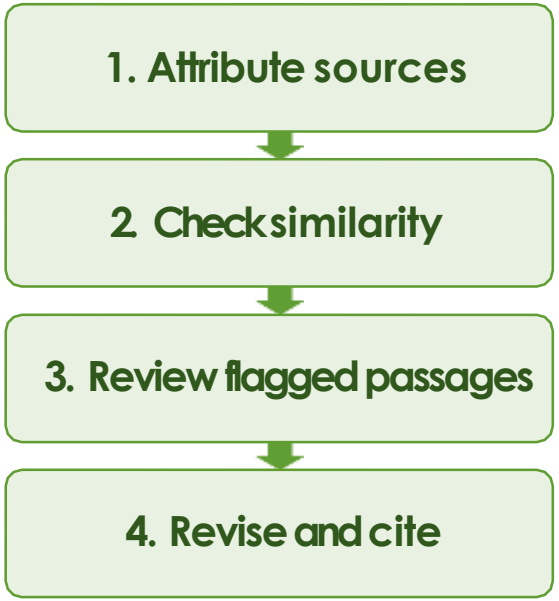
Citation style	Example
APA author–date	(Smith, 2022, p. 45)
IEEE numeric	[1], [2]
Chicago footnote	Superscript [1] + page-bottom note

Upholding Academic Integrity

Plagiarism: Definition & Consequences Prevention Strategies

Plagiarism is the presentation of another person's ideas, words, or data as one's own without proper attribution. Consequences include academic penalties, grade cancellation, expulsion, and damage to scholarly reputation. Both intentional and unintentional plagiarism are treated seriously under institutional integrity policies.

Always cite sources using the required style (APA, MLA, IEEE). Paraphrase ideas in your own words while crediting the original author. Use direct quotations sparingly and enclose them in quotation marks with page references. Run all drafts through anti- plagiarism software (e.g., Turnitin, iThenticate) before submission to ensure originality.



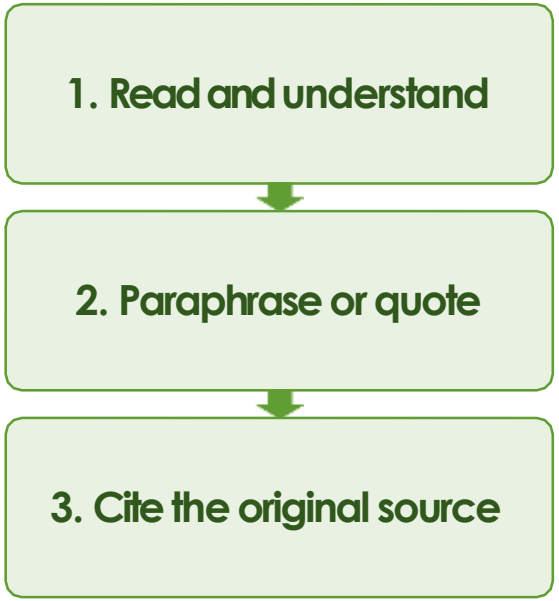
Synthesizing External Information

Paraphrasing for Comprehension

Using Direct Quotations

Paraphrasing is the preferred method for integrating external sources, as it demonstrates the writer's understanding and analytical engagement with the material. Always cite the original source using the appropriate in-text citation format, even when restating ideas in your own words.

Reserve direct quotations for definitions, key theoretical statements, or passages where the original wording is essential. Always include the author, year, and exact page number (e.g., Smith, 2022, p. 45). Overuse of direct quotes may indicate insufficient comprehension of source material.



Standardizing the Reference List

Constructing a Reference List / Bibliography

A complete reference list provides full bibliographic details for every source cited in the paper. Entries are arranged alphabetically (APA, MLA, Chicago) or numerically (IEEE). Each entry must include: author(s), year of publication, title of work, journal or publisher name, volume/issue, page numbers, and DOI or URL where applicable. Consistency in formatting across all entries is essential for academic credibility.

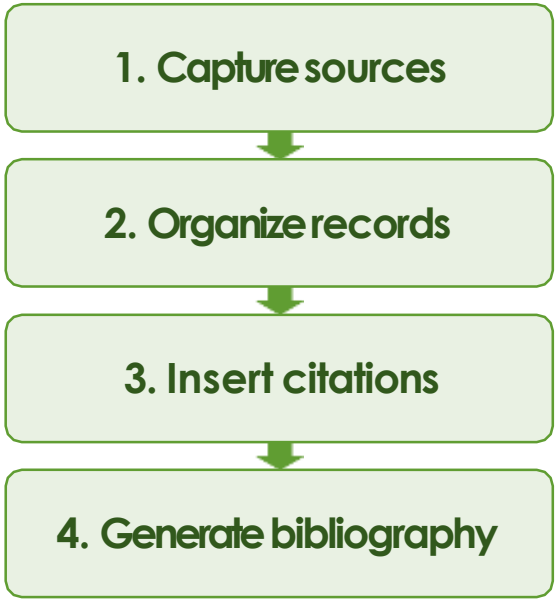


Document layout

Streamlining Bibliographic Automation

Zotero & Mendeley Zotero is a free, open-source reference manager with seamless browser integration for one-click source capture. Mendeley offers PDF annotation, cloud sync, and collaborative library sharing. Both auto-generate citations and bibliographies in APA, MLA, IEEE, and other styles directly within Word or Google Docs.

EndNote & Automation Benefits EndNote is the preferred institutional tool for large-scale research projects, offering advanced search, deduplication, and journal-specific output styles. All reference managers eliminate manual entry errors, auto- reformat citations when switching styles, and integrate with anti- plagiarism workflows to ensure submission-ready bibliographies.



Formatting Tables in Research Works

Table Structure and Numbering

Column Headers and Units

Always create tables using native document tools (e.g., Word's Insert Table), never as embedded images. Each table must carry a sequential number and a concise descriptive title placed above it—for example, "Table 1. Distribution of Survey Respondents by Age Group." Tables should be referenced explicitly in the body text before they appear.

Every column must have a clear, descriptive header indicating the variable and its unit of measurement (e.g., Temperature (°C), Sample Size (n)). Use horizontal lines to separate the header row from data rows; avoid vertical gridlines. Notes explaining abbreviations or data sources are placed below the table, introduced by the word "Note."

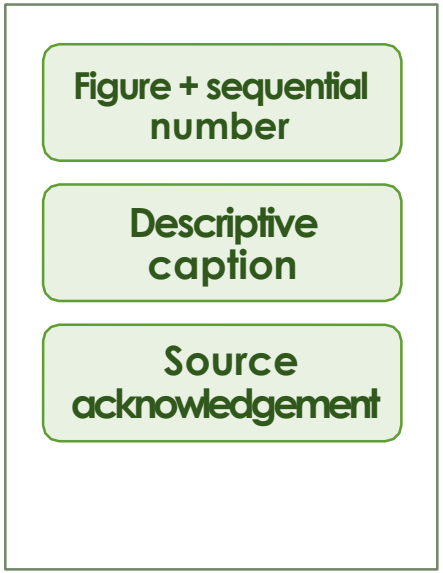
Table component	Required treatment
Number and title	Above the table; sequential
Column headers	Variable name and units
Horizontal rules	Separate header and data
Notes	Below; explain sources / terms

Visual Object Integration

Types of Figures Captions, Legends & Sources

Figures encompass a wide range of visual materials: graphs and charts, photographs, diagrams, maps, illustrations, and screenshots. Each must be high-resolution, clearly legible, and directly referenced within the body text before it appears.

Every figure requires a caption placed below it, formatted as: Figure 1. Descriptive title (Source: Author, Year). Include a legend where applicable. Captions must be concise, informative, and consistent in style throughout the document.

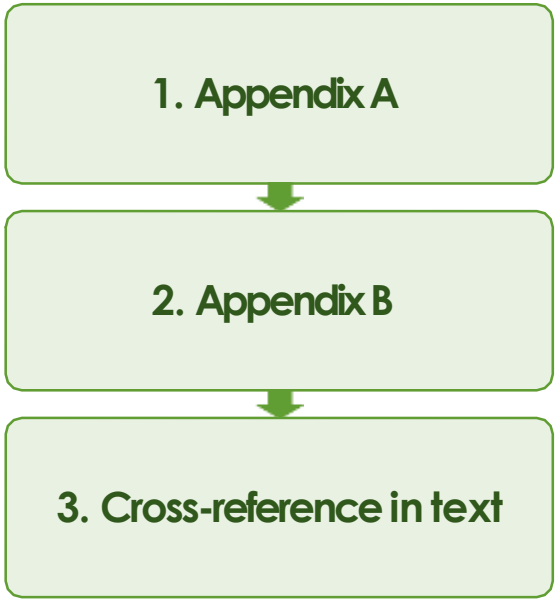


Document layout

Housing Supplementary Material

Structuring Appendices

Appendices house supplementary, lengthy, or highly detailed materials that support but do not belong in the main body. Examples include raw data sets, survey instruments, mathematical proofs, source code, and ethics approval forms. Each appendix is labeled sequentially (Appendix A, Appendix B, etc.) with a descriptive title. Every appendix must be explicitly referenced within the main text (e.g., "see Appendix A") to establish its relevance.



Workshop: Fix the Errors

Draft Errors to Identify Your Assignment Tasks

Review the sample draft and locate the following errors: • Chapter heading is uncentered and incorrectly formatted • Informal personal phrasing used in body text • Image inserted without in-text reference or caption • Citation missing DOI and incomplete bibliographic data • Margin alignment does not meet A4 standard requirements

Complete all three steps below:

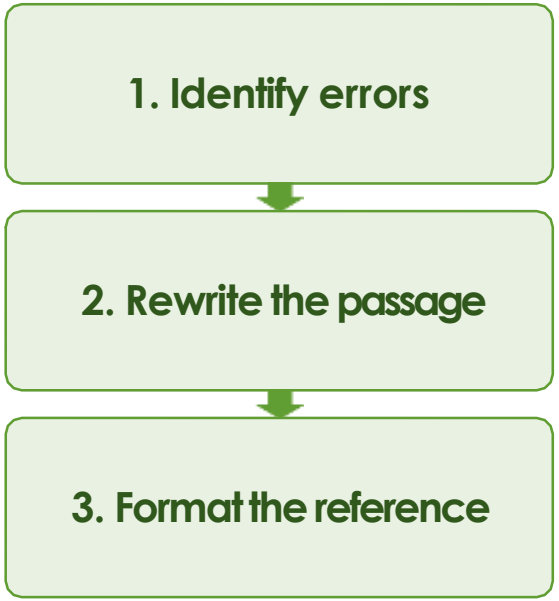
1.Identify and list at least four formatting or style

errors found in the draft 2.Rewrite the informal passage using scholarly

tone, correct grammatical person, and appropriate voice 3.Reformat

the raw source information into a fully

compliant APA 7th ed. or GOST reference entry



References & Handbooks

American Psychological Association. (2020). Publication Manual of the APA (7th ed.).

https://doi.org/10.1037/0000165-000 Modern Language Association. (2021). MLA Handbook (9th ed.). MLA. Chicago Manual of Style Editorial Staff. (2017). The Chicago Manual of Style (17th ed.). University of

Chicago Press. IEEE Periodicals. (2021). IEEE Editorial Style Manual for Authors. IEEE. Turabian, K. L. (2018). A Manual for Writers of Research Papers, Theses, and Dissertations (9th ed.).

University of Chicago Press.

