

## Module 2

# Literature Review and Technical Reading

### Syllabus

Literature Review and Technical Reading, New and Existing Knowledge, Analysis and Synthesis of Prior Art, Bibliographic Databases: Web of Science, Google and Google Scholar, Effective Search: The Way Forward, Introduction to Technical Reading, Conceptualizing Research, Critical and Creative Reading, Taking Notes While Reading, Reading Mathematics and Algorithms, Reading a Datasheet. Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions, What Should Be Acknowledged, Acknowledgments in Books Dissertations, Dedication or Acknowledgments.

#### **Textbook :**

**Dipankar Deb , Rajeeb Dey, Valentina E. Balas**

“Engineering Research Methodology”, ISSN 1868-4394 ISSN 1868-4408 (electronic), Intelligent Systems Reference Library, ISBN 978-981-13-2946-3 ISBN 978-981-13-2947-0 (eBook), <https://doi.org/10.1007/978-981-13-2947-0>

#### **Reference Book:**

**David V. Thiel** “Research Methods for Engineers” Cambridge University Press, 978-1-107-03488-4

## 2.1 Significance of Literature Review and Technical Reading :

The term “literature” is commonly used to refer to the body of written works on a particular subject or within a specific field of study. A literature review, is a systematic and critical analysis of existing scholarly works, literature, and research relevant to a specific research topic.

The primary goals of literature review are :

**Identification of Vaguely Known Problem:** To know the use of content, ideas, or approaches in the literature to correctly identify the problem that is not clearly known before delving into existing research.

**Advocating a Specific Approach:** The literature review enables researchers to advocate for a specific approach or methodology in understanding and addressing the identified problem.

**Assessing Methods Used:** Researchers evaluate and assess the methods used in the literature to address similar problems.

**Ensuring Contribution of Something New and Innovative:** The literature review helps researchers in clearly understanding that their proposed research (the research to be undertaken) will contribute something novel and innovative.

**Evaluating the Quality of a Literature Review:** The quality of such a review can be determined by evaluating whether it includes the appropriate breadth and depth of the area under study, clarity, rigor, consistency, and effective analysis.

## 2.2 New and Existing Knowledge

New knowledge in research can only be interpreted within the context of what is already known, and cannot exist without the foundation of existing knowledge.

**Foundation of Existing Knowledge:** New knowledge is built upon the foundation of existing knowledge. Understanding what is already known is essential or very important in the context of academic writing or research and to support and understand new findings.

### Constructing the Foundation:

Constructing a strong foundation involves reading and surveying literature, both historical and recent. Existing knowledge provides context, significance, originality, and tools necessary for new research.

### Sources of Existing Knowledge:

Where does this existing knowledge come from? Normally, one finds this knowledge by reading and surveying the literature in the field that was established long ago, as well as more recent knowledge, which is always changing.

- (i) **Textbooks:** Literature survey involves reading textbooks on one's topic for established knowledge. Textbooks serve as a starting point for understanding basics. Reading a textbook is not too difficult because it is written as a teaching instrument. The author of the textbook normally starts from the basics and takes the reader through everything needed to understand that topic.
- (ii) **Research Papers:** Research papers contain newer work but assume prior knowledge. Normally, the goal of a research paper is to present a small piece of new knowledge. A research paper contributes newer work but assumes a certain level of prior knowledge in the field from the reader.

### Review Process:

The Literature review process explains how a research item builds on existing work, providing a clear and detailed explanation or clarification of the technical development. A good literature survey provides a convincing answer to why the research is undertaken.

An effective review of the literature ensures a firm foundation for advancing knowledge, facilitates theoretical growth, and identifies gaps for future work.

An efficient literature review focuses on concepts rather than authors.

Generally, a good literature survey is the first expectation of a supervisor from the research student, and when done well can create a good impression that the state of art in the chosen field is well understood.

### Steps for a Literature Survey:

A good literature survey is typically a two-step process as given below:

- (1) **Identification:** Identify major topics, subtopics, or concepts relevant to the research subject under consideration.
- (2) **Categorization:** Organize the topics by placing citations of relevant sources(article/website/data, etc.) in the correct category of concepts.

### Effective Reading and Note-Taking:

In the process, Highlight important sections and then write about them without copying. Writing about highlighted parts helps shape and integrate the knowledge into the researcher's foundation. It helps the stay focused on key points and enhances your understanding of the material.

### Continuous Learning and Writing :

To build a strong understanding of a subject, continuous reading and learning are essential. When reading, marking key sections with an asterisk, highlighting or underlining is a form of active engagement. Beyond marking, expressing one's understanding in writing or taking notes in the margins or in a separate notebook solidifies your understanding.

### Comprehensive Literature Survey:

The literature survey serves as the foundation for your research by providing a **comprehensive overview** which involves a thorough analysis and synthesis of existing scholarly work. This includes articles, books, conference papers, and other archived materials relevant to the chosen topic. By reviewing existing methodologies used in previous studies, the literature survey aids in the identification of suitable research methodologies for your own investigation, provides a firm foundation for a topic of interest, and demonstrates that the proposed work would make a novel contribution to the overall field of research.

## 2.3 Analysis and Synthesis of Prior Art

After collecting the sources, usually articles, intended to be used in the literature review, the researcher is ready to break down each article and identify the useful content in it, and then synthesize the collection of articles. **Breaking Down Each Article:**

A researcher should analyze the relevant information

- (i) **Understanding the Hypothesis :** Clearly comprehend the main hypothesis or research question addressed in each article.
- (ii)**Understanding Models and Experi-**

Table 2.1: Literature Survey Grid

TOPIC\Source	Source 1	Source 2	...	Source M
Topic 1		✓		
Topic 2	✓	✓		
.				
.		✓		
Topic N		✓		✓

**mental Conditions:** Gain insight into the models and experimental setups used in each study. (iii)**Making Connections:** Identify commonalities, patterns, or trends across the articles.

(iv) **Comparing and Contrasting:** Highlight similarities and differences among the articles.

(v) **Finding Strong Points and Loopholes:** Evaluate the strengths and weaknesses of each article, acknowledging areas of robust evidence and potential limitations.

### Critical Analysis :

(i) **Being Suspicious of Claims:** Approach the information with a critical mindset, especially when encountering bold claims.

(ii)**Avoiding Blind Acceptance:** Resist accepting information at face value; critically analyze and question the data.

### Literature Survey Goal:

(i) **Identifying Unsolved Issues:** Recognize gaps or unresolved issues in the existing literature.

(ii)**Determining Problems in Models or Designs:** Evaluate flaws or limitations in current models and experimental designs.

(ii)**Presenting Novel Ideas and Recommendations:** Aim to contribute something new by suggesting innovative ideas or proposing recommendations.

**Critical Evaluation of Information:** Here are a few criteria that could help the researcher in the evaluation of the information under study.

**Authority:** Assess the author's credentials and affiliation, as well as the publisher of the information.

**Accuracy:** Verify the credibility of the information based on existing knowledge and the presence of citations to support claims.

**Scope:** Determine if the source is at an appropriate comprehension or research level.

### Additional Criteria:

**Currency:** Ensure the information is up-to-date.

**Objectivity:** Assess the neutrality and impartiality of the information.

**Purpose:** Understand the goal or intention behind the information.

**Avoiding Extremes:** It is important to ensure that the search question is neither too narrow nor too broad, striking a balance for effective exploration.

## 2.4 Bibliographic Databases

**Bibliographic databases** are referred to as “abstracting and indexing services.” **Purpose:** They play a crucial role in collecting citation-related information and abstracts of research articles from scholarly literature. **Accessibility:** The gathered information is made available through search functionalities, aiding researchers in retrieving relevant literature efficiently.

Example Databases: IEEE Xplore, Engineering Village, Scopus etc.

### Advantages of Simultaneous Searches:

**Diversification:** Simultaneous searches across large databases help avoid excessive dependence on any individual database.

**Limitation Mitigation:** This approach helps researchers to overcome or bypass the inherent limitations or shortcomings associated with a specific database, thereby significantly enhancing the overall quality of their research.

### Criteria for Database Selection

**Swift Identification:** Researchers should be capable of quickly identifying databases relevant to their research.

**Tailored Selection:** The selection of databases should be based on the specific ideas or problems the researcher intends to explore.

#### 2.4.1 Web of Science

Web of Science (formerly known as ISI or Thomson Reuters) includes multiple databases, as well as specialized tools. It is a good search tool for scholarly materials requiring institutional license and allows the researcher to search in a particular topic of interest. Search criteria include the fields that are available in drop down menu such as title, topic, author, address, etc. The tool also allows sorting by number of citations (highest to lowest), publication date etc.

## Effective Searching Techniques :

Use quotes around phrases for precise search.

Add more keywords to refine results.

Utilize the "Refine Results" panel on the left for advanced filtering.

Explore options such as peer-reviewed journals, date, language, etc.

Broaden the search outcomes by taking into account alternative word forms, variations in word endings, and incorporating alternate search terms related to the research topic and connecting them with **OR**.

### Example: ( for a structured approach) :

Research Topic: Graph Theory and Network Analysis.

Search Criteria: Title, Topic, Author.

Keywords: Graph theory, network analysis, connectivity, algorithms.

Refine Results: Select peer-reviewed journal articles, published within the last 3 years.

## Cited Reference Search :

"Cited Reference Search" option enables a researcher to trace articles which have cited a formerly published paper.

Using this element, it is possible to find how a familiar idea has been applied, improved, or extended subsequently.

Example : Discover how a particular concept has evolved over time.

### Example: (for Cited Reference Search)

**\*\*Research Focus:\*\*** Influential papers in Graph Theory.

**\*\*Search:\*\*** Cited references for a classic paper in Graph Theory.

**\*\*Outcome:\*\*** Identify newer papers citing the classic work, exploring advancements or applications.

## Structured Search for Optimal Results

Structured searches enable narrowing and refining of results. Based on the researcher's need the search result can be broadened or narrowed down using the built-in fields provided in the web of science website.

This method is effective and ensures relevance and well-utilized time.

When clicked on any of the search results, this website provides the title of the paper, authors, the type of journal, volume, issue number and year of publication, abstract, keywords, etc., so that the researcher has enough information to decide if it is worthwhile to acquire the full version of the paper.

**Example:** (for Structured Search) :

Objective: Recent developments in network connectivity algorithms.

Structured Search: Use drop-down menus for precise selection (e.g., Topic: Network Analysis, Sorting: Citations - Highest to Lowest).

Outcome: Access a list of highly-cited articles on recent developments in network connectivity algorithms.

### 2.4.2 Google and Google Scholar

**Google** is a starting point for research. It is useful for finding freely available information from various sources such as reports from governments, organizations, companies, and so on. However, there are limitations:

- (i) It is a "Black box" of information, It searches everything on the Internet, with no quality control -one does not know where results are coming from.
- (ii) There are limited search functionality and refinement options.

**Google Scholar** Focuses one's search to scholarly literature . However, there are limitations:

- (i) Some of the results are not actually scholarly. An article may look scholarly at first glance, but is not a good source upon further inspection.



- (ii) Not comprehensive as some publishers do not make their content available to Google Scholar.
- (iii) There is limited search functionality and refinement options.

**Search Operators in Google and Google Scholar** There are search operators in Google and Google Scholar that can be used to help narrow down the results. These help one find more relevant and useful sources of information. Here are some basic search operators:

- (i) **OR**- Broadens search by capturing synonyms or variant spellings of a concept.  
**Example:** Synchronous OR asynchronous will find results that have either term present.
- (ii) **Brackets/Parentheses ( )** - Gathers OR'd synonyms together, while combining them with another concept.  
**Example:** RAM (synchronous OR asynchronous).
- (iii) **Quotation marks " "**- Narrows the search by finding words together as a phrase instead of separately.  
**Example:** RAM (synchronous OR asynchronous) "Texas Instruments".
- (iv) **Site** - limits the search to results from a specific domain or website. This operator is helpful when searching specific websites such as the BC government.  
**Example:** RAM(synchronous OR asynchronous) "Texas Instruments" site: <http://ieeexplore.ieee.org>
- (v) **Filetype**- Limits the search to results with a specific file extension. One could look for pdf's, PowerPoint presentations, Excel spreadsheets, and so on.  
**Example:** RAM (synchronous OR asynchronous) "Texas Instruments" site: <http://ieeexplore.ieee.org>, filetype: pdf.

**Search Tools and Other Options** The Search Tools button at the top of the Google results gives you a variety of other options, such as limiting the results by date. There are other operators and tools that one can use in Google and Google Scholar. Google is just one among many available search tools. Researchers are advised to consider other options beyond Google, for comprehensive research.

### **Challenges and Considerations:**

It can be hard to carefully examine (Sift ) through numerous results in Google or Google Scholar, especially when seeking scholarly resources within a specific subject area.

To find the best resources on a topic, one should search in **academic databases**, in addition to Google. Databases provide access to journal articles and conference proceedings, as well as other scholarly resources.

One should choose databases based on subject area, date coverage, and publication type. Interfaces vary between databases, but the search techniques remain essentially the same.

## 2.5 Effective Search : The Way Forward

Scholarly and popular publications play distinct roles in sharing information in the field of engineering. A thorough understanding of their unique characteristics and knowing where to locate relevant information is essential for conducting research effectively.

### Scholarly Publications:

Scholarly publications are authored by researchers in a specific field of skill. Such work cites all source contents used and is generally peer-reviewed for accuracy and validity before publication. The audience for such works is fellow experts and students in the field. The content is typically more complex and advanced than those found in general magazines.

Scholarly publications contribute to the academic knowledge base and are often a result of original research or in-depth analysis. They adhere to a formal structure, including abstracts, methodologies, results, and conclusions.

### Example:

*Title: "Advancements in Robotics: A Comprehensive Review"*

*Authors: Dr. Engineer, Prof. Researcher*

*Published in: Journal of Robotics*

### Popular Publications :

Popular publications are informal and aim to reach a large number of readers, including experts and enthusiasts. They focus on news and trends, making them suitable for general

reading.

Popular publications serve as a bridge between experts and the general public, providing accessible information on current developments in the field. They may include interviews, case studies, and discussions that make the content more approachable.

**Example:**

*Title: "The Future of Sustainable Energy"*

*Author: Science Enthusiast*

*Published in: Engineering Today Magazine*

**Search Strategies :**

Conducting a comprehensive search is essential for researchers. No single source provides all information needed, so various search tools should be utilized. Information may not be solely online. Researchers should consider the type of information needed and its availability, including print resources. Remember to explore various sources and iterate through different methods to get comprehensive results in your research.

**Iterative Searching Process:**

Searching is an iterative process involving experimenting with keywords and operators, evaluating results, and modifying searches. Once results are generated, carefully evaluate and assess them, utilizing filters to refine the relevant information. If the initial search doesn't yield the desired outcomes, be ready to modify your search terms based on initial results. Additionally, explore citations and references in relevant articles for further sources.

**Critical Reading:**

Following the initial search, engaging in **critical reading** becomes a crucial step in the literature review process. Through this critical reading, researchers are able to make careful observations of salient points within the selected sources. The next steps involve summarizing the key findings extracted from the literature and conducting a detailed comparison and contrast of these findings. This iterative process of observation, summarization, and comparison enhances the depth of understanding and provides a foundation for synthesizing information from various sources. After the search, critical reading is crucial. Observations, summarization, and comparison of findings are part of this process.

**Continuous and Cyclical Process :**

Conducting a literature survey is not a one-time event but rather an ongoing process that

evolves with the expanding body of knowledge. It is a continuous and cyclical process, involving multiple iterations and a thorough understanding of the problem.

### **Skill Development:**

Parsing math-heavy articles, especially those laden with complex equations and algebra, may not be an inherent skill for everyone at the beginning of their research journey. Successful researchers cultivate this skill over time through a combination of extensive reading, seeking assistance when needed, and engaging in relevant coursework. It is crucial to dedicate sufficient time to digest the content and develop one's ideas based on a thorough understanding of the literature. A caution is issued against losing focus of the purpose during an extensive search, underscoring the importance of active reading and the development of ideas.

### **Ph.D. Research Stage :**

Ph.D. scholars are required to undertake the preparation of a synopsis and a comprehensive literature survey as integral components of their research journey. Specifically, during the synopsis stage, scholars are required to undertake an extensive literature survey, using archived journals and bibliographies as primary sources. Acknowledging the iterative nature of the research process, scholars are encouraged to engage in a continuous back-and-forth exploration until the completion of the project.

## **2.6 Introduction to Technical Reading**

Technical reading is a vital skill for researchers, allowing them to remain well-informed and efficient in exploring research literature.

### **Significance of Technical Reading in Research:**

For any active researcher, staying abreast (up-to-date) with the latest research findings in their field is now absolutely necessary. However, locating the right work to read can be challenging due to the vast and fragmented nature of the literature, with knowledge scattered across various sources. This highlights the need for systematic approaches to gather, synthesize, and comprehend dispersed information effectively. Knowing where to read is crucial, and relying on refereed journals and books from reputable publishers is preferred over easily accessible but potentially less reliable web articles. When reading an engineering research paper, the primary goal is to understand the technical contributions made by the authors.

### **Efficient Reading Strategies:**

Given the abundance of journal articles, adopting a purposeful and efficient reading approach is crucial. Technical reading requires multiple readings, it is not the same as reading a newspaper. It often requires spending many hours on a single paper, needing multiple readings for a thorough understanding. Determine the worthiness of a paper through an initial Skimming to decide whether it is worth careful reading. A simple, efficient, and logical approach is described in the next section for identifying articles and reading them suitably for effective research.

### **Time investment through Initial Skimming:**

Determining how much time to invest in reading a paper begins with an initial skimming process. During this process, one typically glances through Title and Keywords, subheadings, introductory and concluding paragraphs, and any highlighted or emphasized text. The goal of initial skimming is to quickly assess the document's structure, main points, and relevance without delving into the details. It helps readers decide whether the paper merits a more in-depth and careful reading.

### **Effective Skimming Techniques:**

When initiating the skimming process, begin with the title and keywords, as these elements are initial attention grabbers. If, upon reading these, it does not seem sufficiently interesting, it is better to stop reading and look for something else to read. One should then read the abstract to get an overview of the paper in minimum time. Again, if it does not seem sufficiently important to the field of study, one should stop reading further. If the abstract is of interest, one should skip most of the paper and go straight to the conclusions to find if the paper is relevant to the intended purpose. If found relevant, focus on reading the figures, tables, and captions, providing a broad understanding of the paper's content.

### **Effective Research Paper Reading Strategy for Students:**

If the paper has continued to be of interest, delve into the Introduction section to grasp the background information about the work and understand why the authors conducted that particular study and how it contributes to the field. The next sections to read are the Results and Discussion sections which is really the heart of the paper. One should really read further sections like the Experimental Setup/Modeling, etc., only if one is really interested and wishes to understand exactly what was done to better understand the meaning of the data and its interpretation.

### **Continuous Search for Relevant Literature : Balancing Content and Author Reputation :**

While working through the literature in this way, it is essential not only to consider the knowledge that is written down but also to take into account the reputation of the authors who contributed to that knowledge. As a researcher, staying updated with relevant literature is an ongoing necessity. For smaller projects, advisors might guide the reading process by assigning a single important paper to read. But larger projects often require independent literature searches. For this, developing a reading strategy for effective research is absolutely necessary for researchers.

## **2.7 Conceptualizing Research**

In formulating research objectives, the focus lies in its ability to centralize new knowledge, gaining acceptance and recognition within the research community. However, the journey begins with the conceptualization of the research itself. Besides being original and significant, a good research problem should also be solvable or achievable. This necessitates consideration of the methods and tools that can be used to obtain that new knowledge effectively. Significance, originality, and the theoretical framework, along with the methods and tools required to address a problem, usually come from the existing documented literature and knowledge in the field.

### **Complexities of Formulating Research Objectives :**

Coming up with a good research objective, conceptualizing the research that meets all of these requirements is a tough thing to do. It means that one must already be aware of what is in the literature. Achieving this demands a thorough understanding of existing literature. A well-defined research objective indicates an advanced level of expertise, particularly at the cutting edge of knowledge. For those engaged in Ph.D. level research or beyond, the task of conceptualizing the research becomes a personal responsibility. This step is particularly challenging as it demands an extensive knowledge of the literature in the field.

### **Crafting Expertise in Ph.D. Research :**

When working at the Ph.D. level, one needs to be prepared to cultivate expertise. Undertaking research at the Ph.D. level requires a readiness to cultivate expertise. It involves a continuous engagement with literature so as to bring together the three parts:

- (i) identifying a significant problem,
- (ii) acquiring the knowledge to address it and
- (iii) a possible way to generate that new knowledge.

The convergence of these three aspects varies uniquely for each researcher and across different fields. However, the only way to become an expert is by continuously reading literature and knowing about what already exists in the field.

#### **Expert Guidance in Literature review:**

When tackling a research project of a smaller scope, such as a master's thesis, the task of conceptualizing the research is possibly too tough to do, particularly when time is a limiting factor. Achieving expertise in a limited timeframe may not be feasible. In these cases, seeking guidance becomes essential. The supervisor, typically an expert and active researcher in the field, can guide on defining a meaningful research objective.

#### **The Essence of Research as Knowledge Creation in Engineering :**

While engineers enjoy building things, the fundamental goal of research lies in the creation of knowledge. When research involves building something, a critical inquiry is necessary to determine if it is indeed contributing to the formation of new knowledge. When engaging in research endeavors, it is important to prioritize uniqueness. Even if a researcher building something new, there's a risk of the work being labeled obvious and rejected as insufficient for the label of genuine research.

**Example:** If the research involves building a new device, ensure it contributes novel insights beyond what is obvious to experienced engineers.

## **2.8 Critical and Creative Reading**

Reading a research paper is a critical process. The reader should not be under the assumption that reported results or arguments are correct. Rather, being suspicious and asking appropriate questions is in fact a good thing.

#### **Asking the Right Questions:**

The reader should ask the following questions during research paper analysis:

- (i) **Problem Solving:** Have the authors attempted to solve the right problem?
- (ii) **Consideration of Alternatives:** Are there simpler solutions that have not been considered?

- (iii) **Limitations:** What are the limitations (both stated and ignored) of the solution?
- (iv) **Missing Links:** Are there any missing links or gaps in the presented work?
- (v) **Reasonable Assumptions:** Are the assumptions made by the authors reasonable?
- (vi) **Logical Flow:** Is there a logical flow to the paper, or are there flaws in the reasoning?

These questions need to be ascertained apart from assessing the relevance and importance of the work, through careful reading.

### **Judgmental Approach:**

Use of judgemental approach and boldness to make judgments is needed while reading. Flexibility to discard previous erroneous judgments is also critical for unbiased analysis.

**Correctness of Data:** Ascertain whether the data presented in the paper is accurate and supports the argument.

**Gathering and Interpretation:** Ascertain whether the data was gathered and interpreted in a correct manner.

**Alternative Datasets:** Decipher whether an alternative dataset would have been more compelling.

### **Critical Reading vs. Creative Reading:**

Critical reading is relatively easier, focusing on finding mistakes, whereas creative reading is more challenging and requires a positive approach in search. In creative reading, the idea is to :

**Search for Other Applications:** Actively look for other applications beyond the stated scope.

**Generalizations and Extensions:** Explore interesting generalizations or extended work that authors might have missed.

**Practical Challenges:** Identify plausible modifications that may present important practical challenges.

**Research Considerations :** Determine if the paper suggests areas for extended research and what should be the immediate next aspect to focus upon.



## 2.9 Taking Notes While Reading

Effective reading is essential for good writing in research. The process of taking notes during and after reading serves as a bridge between reading and writing.

### Importance of Note-Taking and methods:

**Building Knowledge:** Notes aid in building on acquired knowledge.

**Memory Aid:** There is a well-known saying that the faintest writing is better than the best memory, and this holds true for researchers who need to read and build on acquired knowledge. **Marginal Notes:** Many researchers take notes on the margins of their copies of papers or even digitally (annotate) on an article.

**Contents to Highlight:** In each research paper, there are a lot of things that one might like to highlight for later use such as Definitions, explanations, key concepts, questions, and criticisms.

**Long-Term Benefits :** Efforts in note-taking become particularly significant when re-visiting and rereading the material after a long time.

### Concluding a Thorough Reading:

**summary:** On completing a thorough reading, a good technical reading should end with a summary of the paper in a few sentences describing the paper's contributions

**Elucidating Technical Merit:** Elucidate on the importance of understanding the technical merit by comparing the paper with existing works in the same area.

**Evaluation of Innovation:** Assess whether the paper introduces new ideas or implements existing ones in innovative ways. **Novel Framework:** Evaluate if the paper introduces new ideas, or implements existing ideas through experiments or in a new application ones in new ways, or consolidates different ideas under a novel framework.

**Determining Contribution through Comparative Analysis :** The true contribution of a paper is better understood by considering other papers in the same area. Research students should thoroughly analyze how the paper stands out when compared to existing works in the field.

## 2.10 Reading Mathematics and Algorithms

Mathematics serves as the foundation for new advances in engineering research, for evolution and development of engineering research and practice.

### Importance of Meticulous Reading:

Engineering researchers often encounter mathematical derivations and proofs as integral components of their research work. Mathematical derivations and proofs form the heart of any technical paper. Therefore, one should avoid skimming them. After identifying the relevance of the paper, by meticulous reading of the proofs or algorithms, one can develop a sound understanding of the problem that the authors have attempted to solve.

### Selective Skimming in Technical Sections:

While engaging with technical sections, a balanced approach involves selective skimming based on familiarity, relevance, and practical considerations. However, there are exceptions to this approach. Some instances where skimming is acceptable include:

- (i) **Known Concepts or Advanced Material:** It's acceptable to skim a technical section if it explains something already known or if it is too advanced for the research at the present moment and needs additional reading to be understandable
- (ii) **Specialized Content Consideration:** Sections too specialized and seemingly unnecessary for the current research may be skipped temporarily and revisited later if needed.

**Example:** A researcher studying a novel optimization algorithm may meticulously read the mathematical proofs to understand the underlying principles. However, if a section delves into advanced mathematical concepts beyond the current scope, they may choose to skim it and revisit it later.

### Algorithm Implementation:

- (i) **Error-Prone Algorithm Implementation:** Implementing intricate algorithms in programming languages like C, C++, or Java is error-prone, even if the researcher is confident. Quick coding may be necessary to verify functionality.
- (ii) **Practical Testing of Algorithms:** Despite the researcher's confidence in the paper and belief in the algorithm's functionality, there's a fair chance it may not work. Quick coding becomes essential to promptly verify its actual functionality.

## 2.11 Reading a Datasheet

Researchers in various engineering fields encounter different types of documents essential to their work. For instance, mechanical and civil engineers may need to read drawings, while those in the field of electronics often need to read datasheets. Datasheets, in particular, serve as instructional manuals for electronic components, offering insights into their functions and applications. Each discipline requires specific reading skills. On occasions, researchers in other fields may also need to incorporate a certain electronic part in which case careful reading of the datasheet is imperative for a thorough understanding of the component's specifications and applications.

In this context, the importance of mastering the art of reading such documents, beyond traditional technical papers or books, becomes evident.

### Navigating Datasheets: A Guide for Engineers:

1. **Importance of Datasheets:** Datasheets serve as instruction manuals for electronic components, providing details on the component's functionality and usage. Datasheets enable a researcher (or a working professional) to design a circuit or debug any given circuit with that component.
2. **First Page Overview:** The initial page of a datasheet typically summarizes the part's function, features, and basic specifications. It often includes a functional block diagram illustrating the internal functions of the component.
3. **Initial Skimming:** Apply principles of initial skimming to datasheets to determine the need for further careful reading.
4. **Datasheet Components:** Datasheets typically include information on function, features, specifications, functional block diagrams, pinouts, performance graphs, safe operating regions, truth tables, timing diagrams, and package dimensions.
5. **Significance of Pinout:** A pinout provides the physical location of a part's pins, with special mark for pin 1 so that the part can be correctly plugged into the circuit.
6. **Performance Graphs and Safe Regions:** Some parts also provide graphs showing performance versus various criteria (supply voltage, temperature, etc.), and safe region for reliable operation which should be carefully read and noted by the researcher.

7. **Truth Tables and Timing Diagrams:** Lookout for truth tables which describe what sort of inputs provide what types of outputs, and also timing diagrams which lay out how and at what speed data is sent and received from the part(data transmission).
8. **Package Dimensions for PCB Layout:** Datasheets end with with accurate dimensions of the packages a part is available in, essential for PCB(printed circuit board) layout.
9. **Importance of Datasheet Reading:** When working with a new part or selecting components, carefully reading the datasheet is recommended that may potentially save many hours later on.  
**Example:**When undertaking an electronic project, a researcher needs to select a microcontroller. This involves a meticulous reading of the microcontroller's datasheet to comprehend its features, pin configuration, and operating conditions.
10. **Beyond Datasheets - Diverse Reading Materials:**While utilizing datasheets as an illustrative example, the authors' objective is to emphasize the importance of mastering the art of reading various documents. Researchers need to broaden their document literacy beyond technical papers and books, recognizing the diverse range of materials integral to their field.

## 2.12 Attributions and Citations: Giving Credit Wherever Due :

Academic writing, by definition, must follow certain rules and conventions. Among the most important of these are the rules and conventions about citing, referencing, attributing, and acknowledging the works of others. That means giving proper credit wherever due.

**Citing:** Citing is the practice of quoting from, referring to other authors' works and ideas in the text of our work in such a way that the context is clear to the reader.

**Referencing:** Referencing is the listing of the full publication details of a published work that is cited so as to give background information to the readers.

**Attribution:** Properly crediting the contributors for their contributions.

**Acknowledgment:** Acknowledgment in research publications indicates contributions to scientific work.

However, acknowledgment, attributions, and citations differ in the manner of their application. Acknowledgment is arguably more personal, singular, and simply an expression of appreciations and contribution.

In the upcoming sections, we will delve into the various challenges and considerations associated with attributions and citations in academic writing.

## 2.13 Citations: Functions and Attributes

### Role of Citations (References):

Citations credit others for their work, providing readers the means to trace the source publication if necessary. In any new document, any borrowed portion of someone else's work or ideas, be it in papers, patents, or presentations, must be clearly cited to avoid plagiarism. This rule applies to all written sources, encompassing texts, images, sounds, etc. and failure to do may be considered plagiarism. One should avoid distress and embarrassment by learning exactly what to cite. Depending on the exact type of material, the researcher must appropriately credit the creator of the original source.

### Knowledge Growth and Proper Acknowledgment in Research :

**The Growth of Knowledge :** The growth of knowledge in any field, especially in technological fields, is incremental. Researchers build upon prior information as they contribute to the field's development and must ensure proper acknowledgment of existing knowledge.

**Dissemination of Knowledge :** Established means of preventing and spreading knowledge include patent publications, conference papers, peer-reviewed journal papers, articles, textbooks, and classroom education.

**Leveraging Prior Art:** While researchers need to leverage existing knowledge in their research areas for further development, it is equally important to ensure proper acknowledgment and credit for that pre-existing knowledge.

### Citations as Connectors: Establishing Credit and Ethical Responsibility

**Establishing Connections through Citations:** When a researcher includes a bibliography of previously published patents or papers in their new works, it establishes a connection between the new and previous work.

**Providing Due Credit:** In relevance to the context, researchers give due credit through citations. Citations allow readers to verify the quality and importance of the new work, and justification of the findings.

**Ethical Responsibility:** Citations serve as a way to inform readers that certain material in the researcher's present work is sourced from another, and as an ethical responsibility, appropriate credit has been given to the original author or writer.

**Types of Citable Materials:** Materials that can be cited include journal papers, conference proceedings, books, theses, newspaper articles, websites, other online resources, and personal communication.

**Placement of Citations:** Ideally, citations should be provided at the end of a sentence or paragraph. Each citation must contain sufficient details for readers to easily locate the referenced material.

### **Dual Citation Practice: In-Text and References:**

**Dual Citation Requirement:** A researcher is required to cite each source twice:

- (i) In-Text Citation: Within the text of the article, precisely where the source is quoted or paraphrased.
- (ii) References: A second time, typically at the end of the chapter, book, or research article.

### **Consistency in Citation Styles:**

While most citation styles share similar elements, they differ in the order of elements and layout. Unless otherwise specifically required by a particular journal or a book, researchers can choose any style as long as consistency is maintained.

### **Differences in Citation Elements:**

The citation elements differ and so what is to be recorded can differ from one source to another, and it is crucial to adhere to the specific requirements of each source.

### **Inclusion of Publication Date:**

It is important to include the publication date of the source. For web content, the researcher may also need to mention the specific date it was accessed by him.

### **LaTeX: Efficient Document Preparation in Engineering Research :**

**LaTeX as a Document Preparation System:** LaTeX, a document preparation system frequently employed by engineering researchers, is highly efficient in automatically formatting documents according to standard requirements. It proves effective in tracking

and updating citations.

**Learning Curve and Technical Writing:** LaTeX comes with a steep learning curve but is extensively utilized in this book to address various issues related to technical writing, which is intricately linked with research for engineers.

### Functions of Citation :

Citations serve three main functions: verification, acknowledgment, and documentation.

- (i) **Verification Function:** Authors can identify intentional or unintentional distortion of research or misleading statements through citation. Citation offers the readers Citation allows readers to ascertain if the original source is justified in the present work.
- (ii) **Acknowledgment Function:** Researchers receive credit for their work through citations, which plays a crucial role in the promotion of individual researchers and their continued employment. Many Reputed organizations and institutes often provide research funding based on the reputations of the researchers. Citations help all researchers to enhance their reputation and provide detailed background of their research work.
- (iii) **Documentation Function:** Citations are used to document scientific concepts and the historical progress of any particular technology over the years.

### Citations: Currency of Credit and Intellectual Acknowledgment :

**Citations as Currency of Credit:** Citations serve as the currency that authors would wish to accumulate, gives them credit for these contributions. When other authors make citations, they honor those who initiated the ideas.

**Demonstration of Comprehension Skills:** Authors demonstrate their comprehension skills by identifying, estimating, and incorporating other's research work and then create and express their own ideas precisely while acknowledging ownership of ideas through citation.

### Significance of Citing Sources: Enhancing Understanding and Avoiding Infringement :

#### Significance of Citing Sources:

Authors should cite sources to indicate the significance of the work to the reader. Relevant citations assist authors in developing an easily understandable argument, avoiding the need for readers to navigate through irrelevant work outside their areas of interest.

**Infringement on Researcher's Rights:** Failure to cite appropriately infringes on the

rights of the researcher who conducted the original work.

### **Inappropriate Citations: Types and Consequences :**

In certain instances, references fail to fulfill the intended goals of citations and acknowledgments, resulting in a lack of benefit to the reader. Various types of ineffective references exist, each with its own implications. This section investigates various types of inappropriate citations, examining instances where references may not effectively serve their intended purpose.

#### **1. Spurious Citations:**

**Spurious Citations:** In certain cases, when a citation is not required or an appropriate one is not found, including one anyway is considered a spurious citation. These citations lack value for the reader in terms of properly understanding the paper.

**Impact:** Such actions result in the loss of the reader's or reviewer's time, searching for a cited paper that is otherwise not relevant. Just as due credit should be given to a paper through citation, inappropriate credit must be avoided to maintain the credibility of a research work or the journal/conference proceedings where the paper is published.

#### **2. Biased Citations:**

**Biased Citations:** When authors cite the work of their friends or colleagues without a significant connection between the two works, or when they deliberately avoid citing work of genuine significance to withhold credit from certain individuals, these actions are classified as biased citations.

**Impact:** Bias extends to neglecting citations to prior work whose conclusions or data contradict the current work.

#### **3. Self-Citations:**

**Self-Citations:** Citing one's prior work is acceptable if the citation is genuinely relevant. Self-citation of previous papers is natural, especially when the latest paper is part of an ongoing research project. It can benefit the reader by consolidating related works of the same author in one paper, reducing the reader's effort in finding the full versions of those papers. However, it is helpful and ethical only if all the cited papers are genuinely relevant to the present work.

**Impact:** However, inappropriate and irrelevant self-citations can have a negative impact on both the journal and individual researchers. In such cases, self-citations may be considered spurious, biased, or both. Editors of journals who overlook such types of citations and allow them, either due to negligence or other reasons, to be included in published



materials may directly or indirectly alter the impact factor of those publications.

#### 4. Coercive Citations:

**Coercive citations:** Despite their shortcomings, impact factors remain a primary method of quantifying research. One side effect is the creation of an incentive for editors to engage in coercion, pressuring authors to add citations to the editor's journal. Even if not explicitly stated, the implied message is that the author could either add citations or risk rejection. Such coercive demands consequently diminish the reputation of the journal.

**Impact:** Diminishes the reputation of the journal.

From the above discussions, it is clear that the author(s) must maintain a balance between too few and too many citations. At the same time, author(s) must give credit whenever due even if it is their own work.

## 2.14 Impact of Title and Keywords on Citations

The citation rate of a research paper is influenced by various factors, including journal significance, publication types, research area, and the importance of the published work. Additionally, factors such as title length, type, and selected keywords impact citation count.

#### Significance of Research Paper Titles:

The title is the most important attribute of any research paper. It is the main indication of the research area or subject and is used by researcher as a source of information during literature survey. Title plays important role in marketing and makes research papers traceable. A good title is informative, effectively represents the paper to readers, and gains their attention. While some titles may be informative, they might not engage readers, and some titles might be attractive but not informative or related to the readers' research area. The download count and citation of a research paper can be influenced by its title. There are three different aspects which provide a particular behavior to the title:

- (i) types of the title,
- (ii) length of the title, and
- (iii) presence of specific markers. The title is a crucial attribute of any research paper, influencing its traceability and attention from readers.

#### Studies on Title Characteristics :

Research by Stremersch et al. analyzed papers published between 1990 and 2002, in the

area of research and studied relationship between title characteristics and citation, which concluded that title length positively affects the number of citations.

In another study, Sagi and Yechiam, found that highly amusing titles have fewer citations and pleasant titles have no significant relation to citation counts.

Another study by Jacques and Sebire, observed a strong association between title length and citation rates, with highly cited articles having more than twice as many words in the title compared to lower cited papers.

Jamali and Nikzad analyzed several open access papers and found that articles with question-type titles are downloaded more but cited less compared to the descriptive or declarative titles.

Analysis by Habibzadeh and Yadollahie [14] also indicated a strong association between longer titles and higher citation rates. Longer titles mainly include the study methodology and/or results in more detail, and so attracts more attention and citations.

### **General Observations :**

In general, titles containing a question mark, colon, or reference to a specific geographical region tend to be associated with lower citation rates. Titles that describe results typically receive more citations than those describing methods. Additionally, review articles and original articles usually receive more citations than short communication articles. Including at least two keywords in the title can increase the chance of finding and reading the article as well as get more citations.

### **Significance of Keywords in Research Articles :**

Keywords represent essential information as well as main content of the article, which are relevant to the area of research. Search engines, journal, digital libraries, and indexing services use keywords for categorization of the research topic and to direct the work to the relevant audience. Keywords are important to ensure that readers are aware about research articles and their content. If maximum number of allowable keywords are used, then the chance of the article being found increases and so does the probability of citation count of the article. Usage of new keywords should be minimal as such keywords may not be well known to the research community and so may lead to low visibility of the article.

## 2.15 Knowledge Flow Through Citation

Knowledge flows through various channels such as verbal communications, books, documents, video, audio, and images. In the research community, this flow is instrumental in generating new knowledge.

### Forms of Knowledge Flow:

Verbal communications, books, documents, video, audio, and images. This plays a powerful role in research community in promoting the formulation of new knowledge.

### Knowledge Flow in Engineering Research:

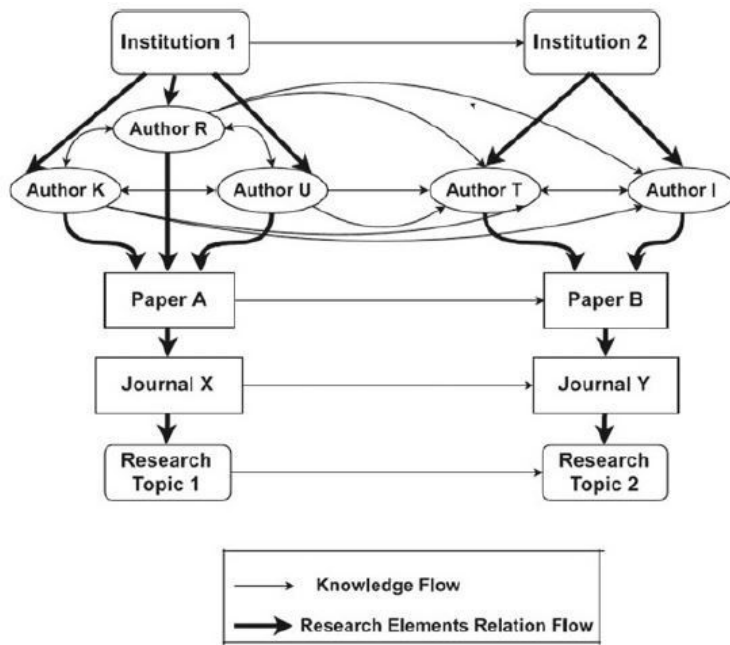
In engineering research, Knowledge flow occurs through books, thesis, articles, patents, and reports. Citing a source is important for transmission of knowledge from previous work to an innovation.

### Production of Knowledge:

Production of knowledge can be related to the citation network. Knowledge flow happens between co-authors during research collaboration, among other researchers through their paper citation network, and also between institutions, departments, research fields or topics, and elements of research.

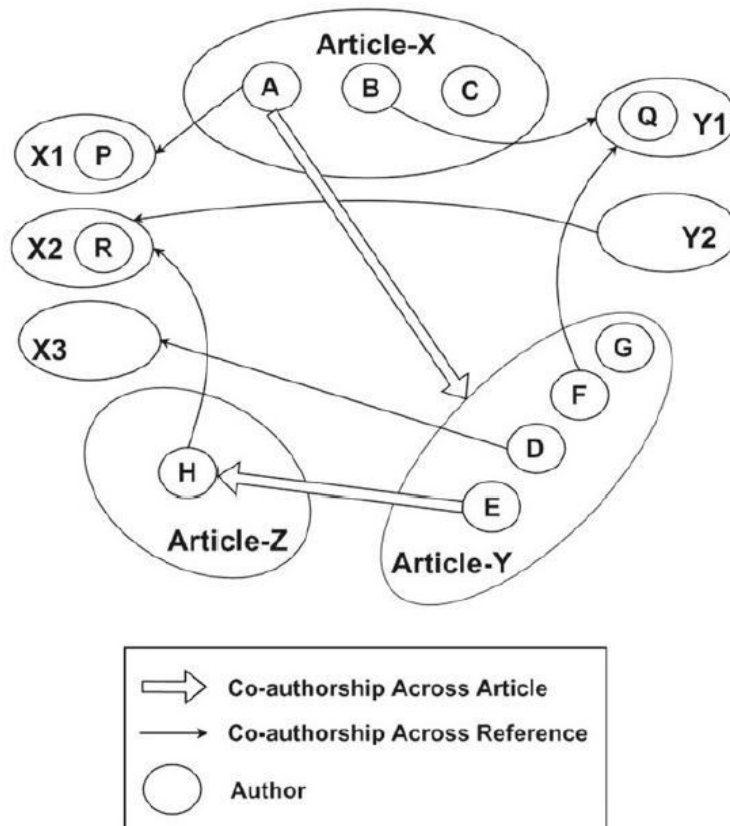
### Illustrative Relationship:

The following figure shows the relationship between citations, knowledge flow, and elements such as researchers, papers, journal publications or conferences, and institutions. If paper A is cited by paper B, then knowledge flows through citation networks across institutions.



### Interdisciplinary Nature of Research :

The complex interdisciplinary nature of research encourages scholars to cooperate with each other to grab more advantages through collaboration, thereby improving quality of the research. Soorya Moorthy, examined the citation impact of the South African publications among different collaboration types, discipline and sectors, and observed that co-authored publications had more citations than single author paper and there was a positive co-relation between number of authors and the number of citations. Following figure shows a relationship between co-authorship and different types of citations.



Three articles (X, Y, and Z) and five references (X1, X2, X3, Y1, and Y2) of article X and Y, respectively, are considered. A, B, and C are authors of article X, and D, E, F, G, and also A are authors of article Y. Article Z has two authors H and E. References X1, X2, X3, Y1, and Y2 have authors (A, P), (H, R), (D), (Q, B, F), and (R), respectively.

Based on co-authorship citation network, references X1 and Y1 are considered self-citation, reference X3 is a level-1 co-author citation because author of article Y is direct collaborator of author A, reference X2 is a level-1 co-author network because author A is collaborator of E who collaborated with H. We conclude that papers which frequently cite collaborators will also often cite collaborators of collaborators. Collaborations certainly impact citation counts.

### 2.15.1 Citing Datasets

Engineering research relies heavily on data. Data citations credit dataset creators, ensuring legal attribution and aiding in future retrieval.

### Ownership of Data :

Ascertaining the ownership of data can be a complicated issue especially with large datasets, and issues of funding can also make it a difficult matter. A researcher should obtain necessary permission for using data from a particular source.

### Citation Information:

Citations related to datasets should include enough information so that a reader could find the same dataset again in the future, even if the link provided no longer works. It is proper to include a mixture of general and specific information to enable a reader to be certain that the search result is the same dataset that was sought.

### Examples

#### Examples:

1. Historical Data, Sotavento (Wind Farm), Corunna, Spain (July 2016): [Accessed: 4 Oct, 2016] Retrieved from <http://www.sotaventogalicia.com/en/real-time-data/historical>
2. Deb, D (2016). [Personnel survey]. Unpublished raw data.

## 2.15.2 Styles for Citations :

Citation styles differ primarily in the order, and syntax of information about references, depending on difference in priorities attributed to concision, readability, dates, authors, and publications. Some of the most common styles for citation (as well as other aspects of technical writing) used by engineers are as follows:

### 1. ASCE Style(American Society of Civil Engineers):

#### (a) Reference list:

This part is to be placed in the bibliography or references at the end of the article or report. A template with example for the same is given below:

#### Template for books:

Author Surname, Author Initial. (Year). Title: Publisher, City, Pages Used.

**Example:** Wearstler, K., and Bogart, J. (2004). Modern glamour. Regan Books, NY.

#### Template for Websites :

Author Credentials and Company Name (Year). 'Title'. [Website URL (Accessed: Date)].

**Example:** Blade cleaning services (2015): [Website URL (Accessed: Oct. 29, 2016)].

**Template for Journal Publications :**

Author Surname, Author Initial. (Year). 'Title'. Publication Title, Volume (issue), Pages.

**Example:** Johnston, L. (2014). "Inconvenient Truth Expanded The Climate Change Dialogue". 1–160.

**(b) In-text citation for journals or books:**

The following part is to be placed right after the reference to the source of the citation assignment:

**Template :**

(Author Surname/Website URL Year Published)

**Examples:**

- i. Citation is a very important part of technical writing. (Deb 2016)
- ii. Engineers create devices to monitor mountains so that nearby inhabitants can be warned of impending eruptions. (Teachengineering.org 2014)

**2. IEEE Style (Institute of Electrical and Electronics Engineers):**

IEEE style is standard for all IEEE journals and magazines, and is frequently used for papers and articles in the fields of electrical engineering and computer science. The IEEE style requires endnotes and that references be cited numerically in the text.

Those submitting to an IEEE publication should see guidelines for the specific journal or magazine and may also refer to the complete IEEE editorial style manual. Some examples of IEEE styles of citations for different types of sources are enumerated below:

Chapter in an edited book example:

[1] A. Rezi and M. Allam, "Techniques in array processing by means of transformations," in Control and Dynamic Systems, Vol. 69, Multidimensional Systems, C. T. Leondes, Ed. San Diego: Academic Press, 1995, pp. 133-180.

**3. ASME Style (The Association of Mechanical Engineers)** Encloses references numerically in brackets within the text.

## 2.16 Acknowledgments and Attributions

The acknowledgment section is a place to provide a brief appreciation of the contribution of someone, an organization, or a funding body to the present work. If no particular guideline is available for the intended publication, then it can be introduced at the end of

the text or as a footnote. Acknowledgment is a common practice to recognize persons or agencies for being responsible in some form or other for the completion of a publishable research outcome.

Acknowledgment displays a relationship among people, agencies, institutions, and research. In some cases, certain individuals may help in the research work but may not deserve to be included as authors. As a sign of gratitude, such contributions should be acknowledged. We can classify acknowledgment into six different categories like moral, financial, editorial, institutional or technical, and conceptual support.

### Categories of Acknowledgment :

1. **Moral Support:** Recognition of individuals or entities providing encouragement or emotional support.
2. **Financial Support:** Acknowledging funding bodies or organizations that financially supported the research.
3. **Editorial Support:** Recognition for contributions in editing or reviewing the manuscript.
4. **Institutional or Technical Support:** Acknowledgment of institutions or individuals providing technical assistance.
5. **Conceptual Support:** Recognizing contributions to the conceptual development of the research.

### Importance of Acknowledgments in Publications :

Acknowledgments and attributions are crucial in the publications of journal or conference papers. Giving proper credit wherever it is due is very important, and even if the contribution is minor, it should not be neglected. A researcher should always recognize the proprietary interest of others. Whenever possible, the author shall give the names of persons who may be responsible, even if nominally, for designs, inventions, writings, or other accomplishments. Given the importance of work published, authorship is also significant.

### Engineering Research Acknowledgments:

In engineering research, acknowledgments are meant for participating technicians, students, funding agencies, grant numbers, institutions, or anyone who provides scientific



inputs, shares unpublished results, provides equipment, or participates in discussions.

**Examples:**

1. "The authors would like to express their gratitude to Dr. Smith for his invaluable conceptual support during the initial phase of this research."
2. "This work was financially supported by the XYZ Foundation (Grant Number: ABC123)."
3. "We acknowledge the technical assistance provided by the engineering team at Institution XYZ."

### 2.16.1 What Should Be Acknowledged?

Every author should know what should and should not be acknowledged. Authors should acknowledge quotations, ideas, facts, paraphrasing, funding organizations, oral discussions or support, laboratory, and computer work.

1. **Quotations** : In technical writing such as in the field of engineering, quotes are used very rarely. Quotations are of two types:
  - (a) **Direct Quotations:** Direct quotations are used when author use actual words or sentences in the same order as the original one. Author should use quotation marks for the words or sentences with proper acknowledgment.
  - (b) **Indirect Quotations:** Indirect quotation summarizes or paraphrases the actual quote. In such cases, it is important to acknowledge with proper name and date.
2. **Contributions** : Authors should acknowledge people who give appropriate contributions to their research work. Non-research work contributions are not generally acknowledged in a scientific paper but may be in a thesis. Persons must be acknowledged by authors who provided scientific or technical guidance, participated in discussions, or shared information. Authors should acknowledge assistants, students, or technicians, who helped experimentally and theoretically during the research work.
3. **Funding Support** : If the researcher received a grant from a funding agency, and if those funds were used in the work reported in the publication, such support should always be acknowledged by providing full details of the funding program and grant

number in the acknowledgment section.

Authors should gratefully acknowledge the use of services and facilities of any center or organization with which they are not formally affiliated.

**Example:** An example of acknowledgment of grant received is as follows:

Acknowledgments: This research work was funded in part by the Extra-Mural Research Funding 2014–17 (Individual Centric) of the Department of Science and Technology (DST), Govt. of India.

If there are concerns that providing acknowledgment information may compromise anonymity, authors may withhold this information until the submission of the final accepted manuscript. Many technical journals explicitly discourage authors to thank the reviewers in their article submissions. This could be construed as favoritism or an attempt to encourage reviewers to accept their manuscript for reasons other than scientific merit.

4. **Acknowledging that results have been presented elsewhere:** If the results were presented as an abstract in a journal, then there should be a suitable citation. If the results were presented as part of scientific meeting, symposium, or other gathering, then some relevant information should be provided. At the very least, the name of the gathering and year should be cited. Other helpful items include the location of the gathering (city and state or country) and the full date of the occasion.

By acknowledging all help received in one's research work, the author(s) demonstrate integrity as a researcher, encouraging continued collaboration from those who helped out in different ways.

Acknowledgment is no longer simply a means of expressing gratitude. Funding agencies often require acknowledgment and explicitly state the required information for publication resulting from the funded project. Failure to acknowledge funding may result in the discontinuation of current funding and/or ineligibility to receive future funding.

Unless the information can be considered "common knowledge," proper attribution of an idea, algorithm, computational methodology, or experimental design is required even if a journal operates with double-blind review.

### **2.16.2 Acknowledgments in Books/Dissertations**

A page of acknowledgments is usually included at the beginning of a thesis/dissertation, immediately following the table of contents. These acknowledgments are longer than the one or two sentence statements in journal papers or articles in conference proceedings. Detailed acknowledgments enable the researcher to thank all those who have contributed to the completion of the research work. Careful thought needs to be given concerning those whose inputs are to be acknowledged and in what order. Generally, one should express appreciation in a concise manner and avoid emotive language. The following are often acknowledged in these types of acknowledgments: main supervisor, second supervisor, peers in the lab, other academic staff in the department, technical or support staff in the department, colleagues from other departments, other institutions, or organizations, former students, family, and friends.

#### **Sample Acknowledgment in Thesis :**

I wish to express my sincere appreciation to my supervisor Prof. Gang Tao for the useful comments, remarks, and encouragement throughout this thesis work. Furthermore, I wish to express my thanks to Prof. Jacob Hammer for introducing me to the topic and for the support along the way. Also, I would like to thank my peers in the Adaptive Control Lab such as Yu Liu and Shanshan Li, who have shared their precious time during many lively technical discussions. I would like to thank my family members who have supported me throughout this journey in many different ways.

### **2.16.3 Dedication or Acknowledgments?**

Dedication is almost never used in a journal paper, an article in a conference proceedings, or a patent. It is used exclusively in larger documents like books, theses, or dissertations. While acknowledgments are reserved for those who helped out with the document in some way or another (editing, moral support, etc.), a dedication is to whomever the author would like it to be dedicated to, whether it is the author's mother, best friend, pet dog, or Almighty God. It is possible to dedicate something to someone while also mentioning them in the acknowledgments. For example, one may dedicate a book to one's spouse but acknowledge them for being the moral support and putting up with when one got very stressed.

The acknowledgments in technical books can sometimes be as brief as the ones in journal articles. The acknowledgment section of a technical report may be a paragraph longer than a journal paper but shorter than dissertations. Generally, the length of the acknowledgment may have some correlation with the length of the document.

## Question Bank

1. Describe the process of synthesizing knowledge from a variety of sources when performing literature review. Discuss any difficulties you might have faced while synthesizing the information.
2. Describe the process of analyzing and synthesizing prior art in a literature review
3. Explain the essential steps in analyzing and synthesizing prior art during literature review
4. What is the role of bibliographic databases in academics and research? Provide examples.
5. Describe your search strategy when using Web of Science or Google Scholar for literature review.
6. Which are the steps to effectively search for a given topic in a bibliographic database.
7. What factors should be taken into account when taking notes while reading technical documentation?
8. Explain the role of effective note-taking in the context of research literature, emphasizing its significance as a bridge between reading and writing.
9. Analyse and infer key points from a given mathematical or algorithm-based scholarly article.
10. Explain the steps involved in Reading Mathematics and Algorithms
11. Explain the key strategies and considerations involved in navigating datasheets effectively.
12. How does acknowledging and attributing work in the academic world affect the knowledge flow?

13. Examine the functions and attributes of citations in academic writing, emphasizing their significance in acknowledging sources, maintaining scholarly integrity, and contributing to the credibility of a research work. Provide examples to illustrate how proper citation practices enhance the quality of academic writing and uphold ethical standards.
14. What are the effects of keywords and titles on paper citation? Discuss with examples.
15. Discuss the factors influencing the citation rate of a research paper, with a specific focus on the impact of title characteristics (length and type) and the selection of keywords.
16. Explain how styles for citations differ and how does it impact your work?
17. Examine the dynamics of knowledge flow through citation in the research community.
18. Explore the dynamics of knowledge flow through citation, focusing specifically on citing datasets and the various citation styles employed in academic writing.
19. Examine the different categories of acknowledgment in academic publications, discussing their significance in recognizing contributions, fostering collaboration, and maintaining scholarly integrity.
20. What should be acknowledged in a research paper and why? Discuss with examples.
21. Explain the significance of technical reading for researchers and how it enhances their ability to navigate research literature effectively.
22. How do citations contribute to the knowledge flow through different research papers?
23. Discuss the critical elements involved in conceptualizing research, with a focus on the importance of formulating research objectives, ensuring the solvability of a research problem, and the role of existing literature and knowledge in shaping the theoretical framework and methods.
24. Compare the concepts of “Asking the Right Questions,” a “Judgmental Approach,” and the distinction between “Critical Reading” and “Creative Reading” in the context of research literature engagement.
25. Why is it important to acknowledge the sources of information in research and what should be acknowledged?

26. How can the impact of title and keywords on citations be determined?
27. What are the effects of citing datasets in research?
28. Discuss the integral relationship between existing and new knowledge in research, exploring the construction of a strong foundation through literature review, the influence of background and perception, and the challenges presented by diverse sources such as textbooks and research papers.
29. Discuss the importance of a literature review in research. How does it contribute to the understanding of existing knowledge and the formulation of new ideas? Explain the role of technical reading in this process, highlighting key strategies for effective technical reading.
30. Explore the challenges and strategies associated with reading mathematical content, algorithms, and datasheets in technical literature. How do researchers navigate complex technical information in these forms?
31. Examine the nuances of acknowledgments in academic writing, focusing on what should be acknowledged, the specific considerations for acknowledgments in books and dissertations, and the choice between dedication and acknowledgments.
32. Discuss the significance of acknowledgments in academic writing, outlining key elements that authors should acknowledge.
33. Examine the specific considerations and characteristics of acknowledgments in books and dissertations.