Lesson 2

RESEARCH AND INFORMATION GATHERING FOR PROJECTS

หัวข้อเรื่อง (Topics)

1. Why Research and Information Gathering Are Important
2. Techniques for Effective Research and Information Gathering
3. Steps for Effective Online Searches
4. Using Online Resources and Databases
5. Evaluating the Credibility of Sources
6. Citation and Referencing in English Project Reports

1. Introduction to Research and Information Gathering for Projects

Research and information gathering are important steps to complete a project.

- Research means finding new facts, ideas, or solutions about a topic.

Why Research and Information Gathering Are Important

1. Learn More: Research helps us know more about a topic.

2. Solving Problems : It helps find and fix problems.

3. Make Good Choices : Good information helps us make better decisions.

4. Creating New Ideas : Research gives new ideas.

5. Improving Skills : It helps us think better and explain clearly.

Today, it's easy to find information online. But we must check:

- Who wrote it?
- Is it correct and useful?
- Is it new and fair?

We must also cite (give credit) to the original writers to avoid copying (plagiarism). Citation styles like APA, MLA, and Chicago help us do this.

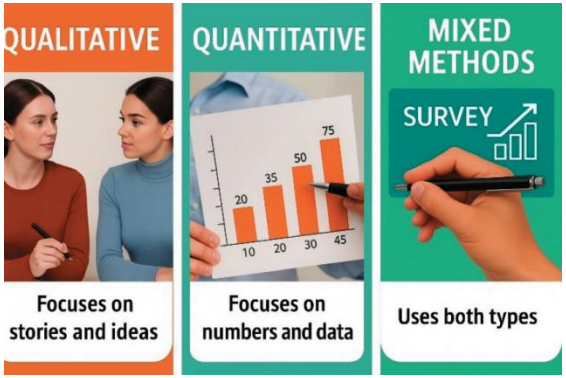
2. Techniques for Effective Research and Information Gathering

Introduction to Research Methods

Why Research is Important in Projects :

1. Make Smart Choices : Research helps us understand and decide correctly.
2. Understand the Project : It helps set clear goals and steps.
3. Be Ready for Problems : It helps find problems early.
4. Use Facts : Facts are better than guesses.
5. Get Better : Learn from the past to do better next time

Types of Research:



- Qualitative : Focuses on stories and ideas (e.g., interviews).
- Quantitative : Focuses on numbers and data (e.g., surveys).
- Mixed Methods : Uses both types.

Tips for Finding Information :

1. Know what you want to find.
2. Use trusted sources (books, experts, good websites).
3. Search smartly (use quotes, keywords).
4. Check if the information is correct.
5. Change search words if needed.

Exercise 1 : Read each question carefully and select the best answer.

1. Why is research important in project work?

a) To make random choices

b) To stay unprepared for surprises

c) To make informed decisions

d) To avoid learning from past experiences

e) To guess without any evidence

2. Which Boolean operator is used to provide results that contain both or all keywords?

a) AND

b) OR

c) NOT

d) Quotation marks

e) Asterisk (*)

3. What does the Boolean operator NOT or AND NOT do?

a) Find exact phrases

b) Find different forms of a word

c) Find the first keyword but remove the second

d) Group keywords together

e) Search results in alphabetical order

4. Which symbol is used to find an exact phrase?

a) Exclamation mark (!)

b) Parentheses ()

c) Asterisk (*)

d) AND

e) Quotation marks (“ ”)

5. What does the asterisk (*) do in online searches?

a) Group keywords together

b) Find results with all keywords

c) Find exact phrases

d) Find different forms of a word

e) Add emojis to search results

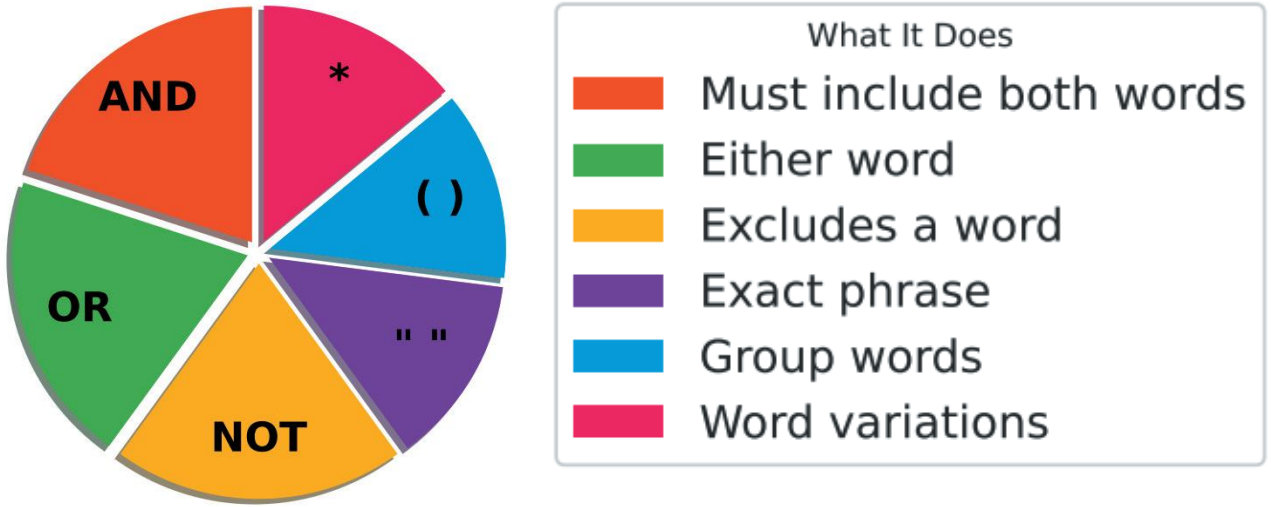
3. Steps for Effective Online Searches

1. Find Keywords : Pick the important words in your question.

   Example : “How does climate change affect coral reefs?” → Keywords = climate change, coral reefs.

2. Use Boolean Operators :
   - AND : Find results with all words.
   - OR : Find results with any of the words.
   - NOT : Remove results with unwanted words.

Common Boolean Operators for Online Searches



Use these operators to narrow or expand your search results effectively.

Boolean operator	Function	Example
AND	Must include both words	solar AND battery
OR	Either word	solar OR battery
NOT	Excludes a word	solar NOT battery
Quotation marks (“ ”)	Exact phrase	“solar energy”

Boolean operator	Function	Example
Parentheses ()	Group words	(solar OR battery) AND technology
Asterisk (*)	Word variations	run* (running, runner, runs)

These tools help refine online searches by including, excluding, or grouping keywords.

Exercise 2 : Read each question carefully and choose the correct answer.

1. What are Boolean operators used for in online searches?

a) Find main keywords

b) Connect or remove keywords to get better search results

c) Group keywords with parentheses

d) Search for exact phrases

e) Translate results into different languages

2. Which Boolean operator is used to provide results that contain both or all keywords?

a) AND

b) OR

c) NOT

d) Quotation marks

e) Asterisk (*)

3. What does the Boolean operator NOT or AND NOT do?

a) Find exact phrases

b) Find different forms of a word

c) Find the first keyword but remove the second

d) Group keywords together

e) Search results in alphabetical order

4. Which symbol is used to find an exact phrase?

a) Exclamation mark (!)

b) Parentheses ()

c) Asterisk (*)

d) AND

e) Quotation marks (“ ”)

5. What does the asterisk (*) do in online searches?

a) Group keywords together

b) Find results with all keywords

c) Find exact phrases

d) Find different forms of a word

e) Add emojis to search results

4. Utilizing Online Resources and Databases :

After you make a question, you can search for information online about technician work.

1. Example Website : OSHA
   - OSHA gives tips about safety at work, like electrical safety and machine safety.
2. Example Database : IEEE Xplore
   - IEEE Xplore has many papers about motors, machines, and new tools.
   - Use keywords like motor, wiring, machine re
   - Use AND, OR, NOT to find better results

Good websites and databases help you fifind the right information for your project.

Exercise 3 :

1. Choose a question:

- How do new machines help technicians?
- What safety rules are important for electricians?
- How does learning about machines make technicians better?

2. Search on OSHA or NIOSH.

Write two things you find:

1.

.....

2.

.....

3. Search on IEEE Xplore or ResearchGate

Write two articles you find:

1.

.....

2.

4. Think about your search:

- Did you find what you needed?

Answer :

..... • How did AND, OR, NOT help?

Answer :

.....

- Was it easy or hard?

Answer :

.....

5. Evaluating the Credibility of Sources

Evaluating credibility means checking if the information is good and can be trusted. Check these things:

1. Authority : Is the writer an expert?
2. Accuracy : Are the facts correct?

3. Objectivity : Is it fair?

4. Currency : Is it new?

5. Relevance : Is it useful for your topic?

Good vs Bad Sources:

• Good : Book by an expert, government website, research paper.

• Bad : Random blog, fake news website, social media post without proof.

By using these tips, you can find trustworthy information for your research.

Exercise 4 : Evaluate the Credibility of Sources

(Source: “The Future of Renewable Energy for Technicians”)

- Writer : A teacher from a famous technical school.
- Published in : A well-known engineering magazine.
- Info : Talks about new ways technicians can use renewable energy, with research to support.

Assessment :

1. Authority : The writer knows about engineering.
2. Accuracy : The article uses real research.
3. Objectivity : It gives facts, not opinions.
4. Currency : No date, but still useful.
5. Relevance : The topic fits technician work.

Please grade the assessment's credibility as High, Low, or Uncertain.

1. Authority :

.....

2. Accuracy :

.....

3. Objectivity :

.....

.....

5. Relevance :

6. Citation and Referencing in English Project Reports

What are Citation Styles?

Citation styles are rules that show where you got your information. They help readers find your sources and check your facts.

Three Common Citation Styles :

1. APA Style

- Used for social sciences and education
- In-text: (Author's Last Name and Year) → Example: (Smith, 2019).
- Full list at the end.

2. MLA Style

- Used for humanities and literature.
- In-text: (Author's Last Name and Page Number) → Example: (Smith 123).
- Works Cited page at the end.

3. Chicago Style

- Used for history and arts.
- Two types:
    - o Notes and Bibliography (footnotes or endnotes)
    - o Author-Date (like APA)
- Full list at the end

Why is Proper Citation Important?

1. Give Credit : Respect the original authors.
2. Help Readers : Easy for others to find your sources.
3. Build Trust : Makes your work more reliable.
4. Avoid Plagiarism : Don’t copy without giving credit.

Exercise 5 : Match the citation style with its description :

Citation styles	description
1. APA Style	A. Has two formats: notes and bibliography, or author-date.
2. MLA Style	B. Uses the author's last name and page number in parentheses.
3. Chicago Style	C. Often used in social sciences and psychology.

Citatoin Styles

Descriptoin

How to Format Citations:

1. Books :

- Author Last Name, First Initial. (Year). *Title of Book.* Publisher.

  Example : Smith, J. (2020). *The Art of Writing.* Penguin Books.

2. Articles :

- Author Last Name, First Initial. (Year). Title of Article. *Title of Journal, Volume*(Issue), Page Range.

  Example : Johnson, R. (2019). The Impact of Technology on Education. *Journal of Educational Research, 25*(3), 45-60.

3. Websites :

- Autho Last Name, First Initial. (Year, Month Day). Title of Webpage. Website Name. URL

  Example : Teja, R. (2024, March 18). What is a resistor? Resistivity and resistance units. Electronics Hub. https://www.electronicshub.org/introduction-to-resistors/

Exercise 6 : Format the following citations

1. Book :

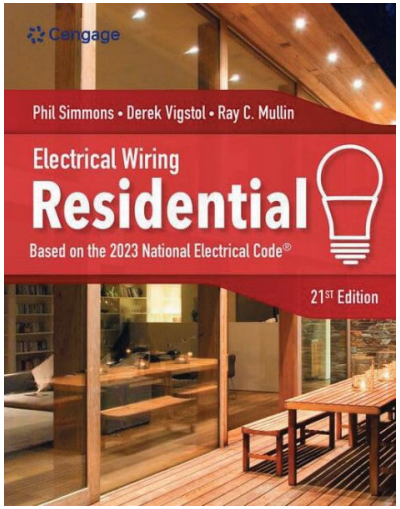
Title : Electrical Wiring Residential

Author : Phil Simmons, Dereck Vigstol,

and Ray C. Mullin

Year : 2023

Publisher : Cengage Learning



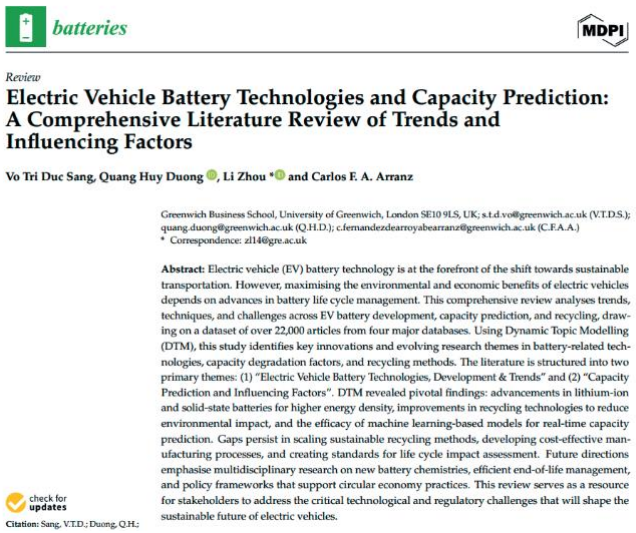
2. Article :

Title : Electric Vehicle Battery Technologies and Capacity Prediction: A Comprehensive Literature Review of Trends and Influencing Factors

Author : Sang, V. T. D., Duong, Q. H., Zhou, L., & Arranz, C. F. A.

Year : 2024

Journal : Batteries, Volume 10, Issue 12, Article 451



batteries

MDPI

Review

Electric Vehicle Battery Technologies and Capacity Prediction: A Comprehensive Literature Review of Trends and Influencing Factors

Vo Tri Duc Sang, Quang Huy Duong, Li Zhou * and Carlos F. A. Arranz

Greenwich Business School, University of Greenwich, London SE10 9LS, UK; s.t.d.vo@greenwich.ac.uk (V.T.D.S.); quang.duong@greenwich.ac.uk (Q.H.D.); c.fernandezdearroyabearranz@greenwich.ac.uk (C.F.A.A.)
* Correspondence: zl140@gre.ac.uk

Abstract: Electric vehicle (EV) battery technology is at the forefront of the shift towards sustainable transportation. However, maximising the environmental and economic benefits of electric vehicles depends on advances in battery life cycle management. This comprehensive review analyses trends, techniques, and challenges across EV battery development, capacity prediction, and recycling, drawing on a dataset of over 22,000 articles from four major databases. Using Dynamic Topic Modelling (DTM), this study identifies key innovations and evolving research themes in battery-related technologies, capacity degradation factors, and recycling methods. The literature is structured into two primary themes: (1) "Electric Vehicle Battery Technologies, Development & Trends" and (2) "Capacity Prediction and Influencing Factors". DTM revealed pivotal findings: advancements in lithium-ion and solid-state batteries for higher energy density, improvements in recycling technologies to reduce environmental impact, and the efficacy of machine learning-based models for real-time capacity prediction. Gaps persist in scaling sustainable recycling methods, developing cost-effective manufacturing processes, and creating standards for life cycle impact assessment. Future directions emphasise multidisciplinary research on new battery chemistries, efficient end-of-life management, and policy frameworks that support circular economy practices. This review serves as a resource for stakeholders to address the critical technological and regulatory challenges that will shape the sustainable future of electric vehicles.

check for updates

Citation: Sang, V.T.D.; Duong, Q.H.;

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3. Website :

Title : Understanding Renewable Energy

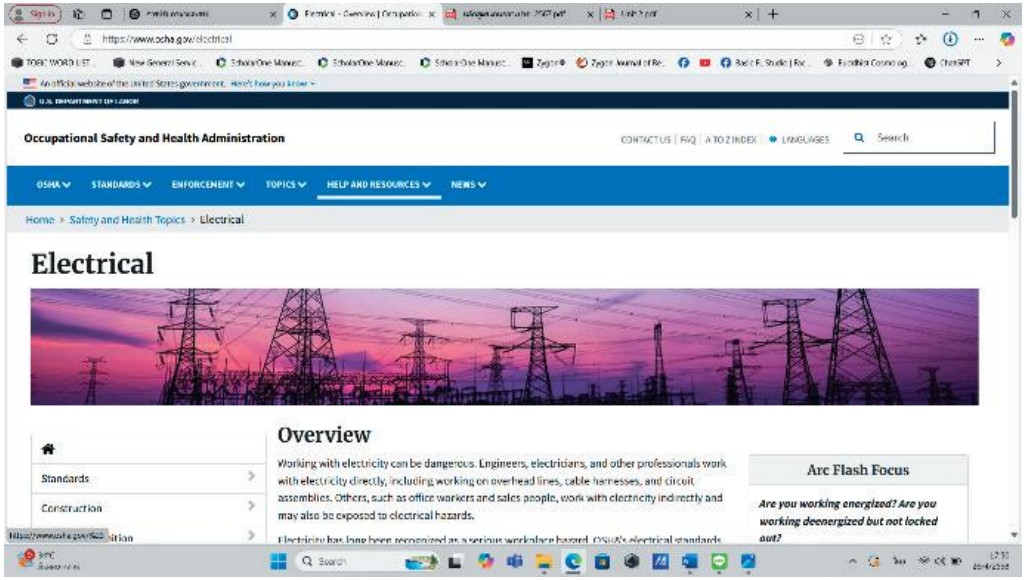
Author : Sarah Green

Year : 2019, March 10

Publisher : Cengage Learning

Website : Renewable Energy Resources

URL : https://www.renewableenergyresources.com/understanding-renewable-energy



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Exercise 7 : Cite in APA style to fill in the blanks.

Author Information :

- Johnson (2018) → circuit analysis and design
- Smith (2019) →semiconductor devices and circuits
- Brown (2020) →signal processing and control

"In the field of electrical engineering (.....), understanding circuits is essential. Circuits are pathways through which electricity flows, consisting of components like resistors, capacitors, and inductors. One of the fundamental laws governing electrical circuits is Ohm's Law (.....), which relates voltage, current, and resistance. Another important concept is Kirchhoff's Laws (.....), Year), which describe the conservation of charge and energy in electrical circuits. Mastery of these principles is crucial for designing and analyzing complex electrical systems."

Vocabularies in Research and Information Gathering

Important Vocabularies	Definition	Thai Meaning
Information Gathering	Collecting details to understand a topic better.	การรวบรวมข้อมูล
Critical Thinking	Analyzing and evaluating information carefully.	การคิดวิเคราะห์
Credibility	The trustworthiness of information or a source.	ความน่าเชื่อถือ
Authority	The expertise or qualifications of the author.	ผู้มีความรู้/ความเชี่ยวชาญ
Accuracy	How correct and reliable the information is.	ความถูกต้อง
Objectivity	Presenting information fairly without bias.	ความเป็นกลาง

Important Vocabularies	Definition	Thai Meaning
Currency	How recent or up-to-date the information is.	ความทันสมัย
Relevance	How closely the information matches the topic.	ความเกี่ยวข้อง
Citation	Giving credit to the source of information.	การอ้างอิง
Plagiarism	Using others' work or ideas without credit.	การลอกเลียนผลงาน
Boolean Operators	Words like AND, OR, NOT to refine searches.	ตัวดำเนินการบูลีน
Quotation Marks	Symbols to find exact phrases in searches.	เครื่องหมายอัญประกาศ

Important Vocabularies	Definition	Thai Meaning
Asterisk	A symbol (*) to find word variations.	เครื่องหมายดอกจัน
Parentheses	Symbols ( ) to group and order keywords.	เครื่องหมายวงเล็บ
Reference List	A list of all sources cited in a paper.	รายการอ้างอิง
APA Style	A format for citing sources in social sciences.	รูปแบบการอ้างอิง APA
MLA Style	A format for citing sources in humanities.	รูปแบบการอ้างอิง MLA
Chicago Style	A format for citing sources in history and arts.	รูปแบบการอ้างอิง Chicago

Important Vocabularies	Definition	Thai Meaning
Database	A collection of organized information for searching.	ฐานข้อมูล
ScienceDirect	A database for scholarly articles and papers.	ฐานข้อมูล ScienceDirect
NIOSH	An organization focusing on workplace safety.	สถาบัน NIOSH
OSHA	A government agency for workplace safety regulations.	สำนักงาน OSHA
IEEE Xplore	A library for engineering and technical research.	ฐานข้อมูล IEEE Xplore
Search Engine	A tool like Google for finding online information.	เครื่องมือค้นหา
Keyword	A specific word used in searches to find relevant info	คำสำคัญ