How to review literature?

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Focus of the talk

What is research ?

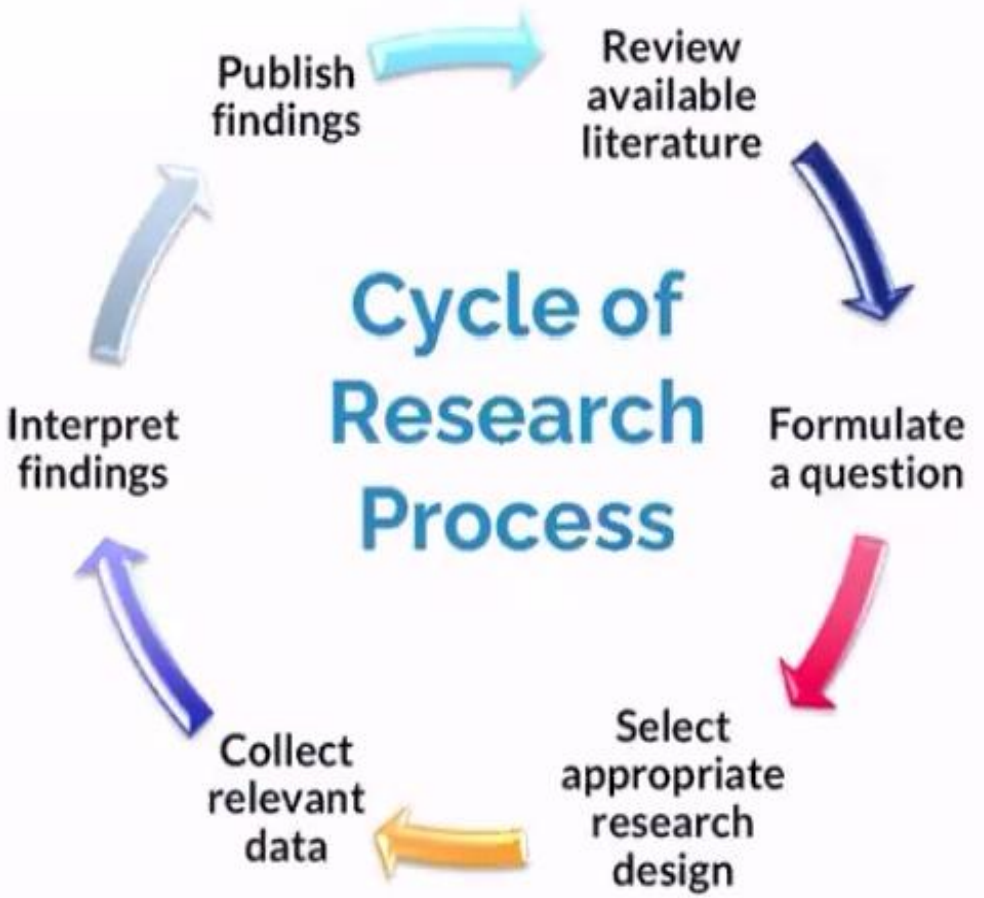
How to decide a topic/subject for research?

How to review the literature?

What is the purpose of reviewing the literature?

What are the available resources?

How to organize the contents?


Cycle of Research Process
Review available literature
Formulate a question
Select appropriate research design
Collect relevant data
Interpret findings
Publish findings

What is Research ?

- It is the systematic and rigorous scientific investigation of a situation or problem in order to generate new knowledge or validate existing knowledge, to contribute to its advancement.
- It is an endeavour to discover new or collate old facts by the scientific study of a subject or by a course of critical investigation.
- According to Redman and Mory, Research is a "Systematized effort to gain new knowledge".
- In essence, Research is the search for knowledge, using objectives and systematic methods to find solution to a problem.

Types of Research

- On a broader perspective, all researches can be categorized into two groups:

Qualitative Research ✓

Quantitative Research ✓

Qualitative Research

- It refers to the non-numerical observations to address 'WHY' questions.
- Qualitative research deals with phenomena that are difficult or impossible to quantify mathematically, such as beliefs, meanings, attributes, symbols, etc.
- Qualitative research techniques include focus groups, interviews, and observations-
  - to unravel pattern, trends;
  - insight for hypothesis;
  - understand reason and motivation.

Quantitative Research

Qualitative Research

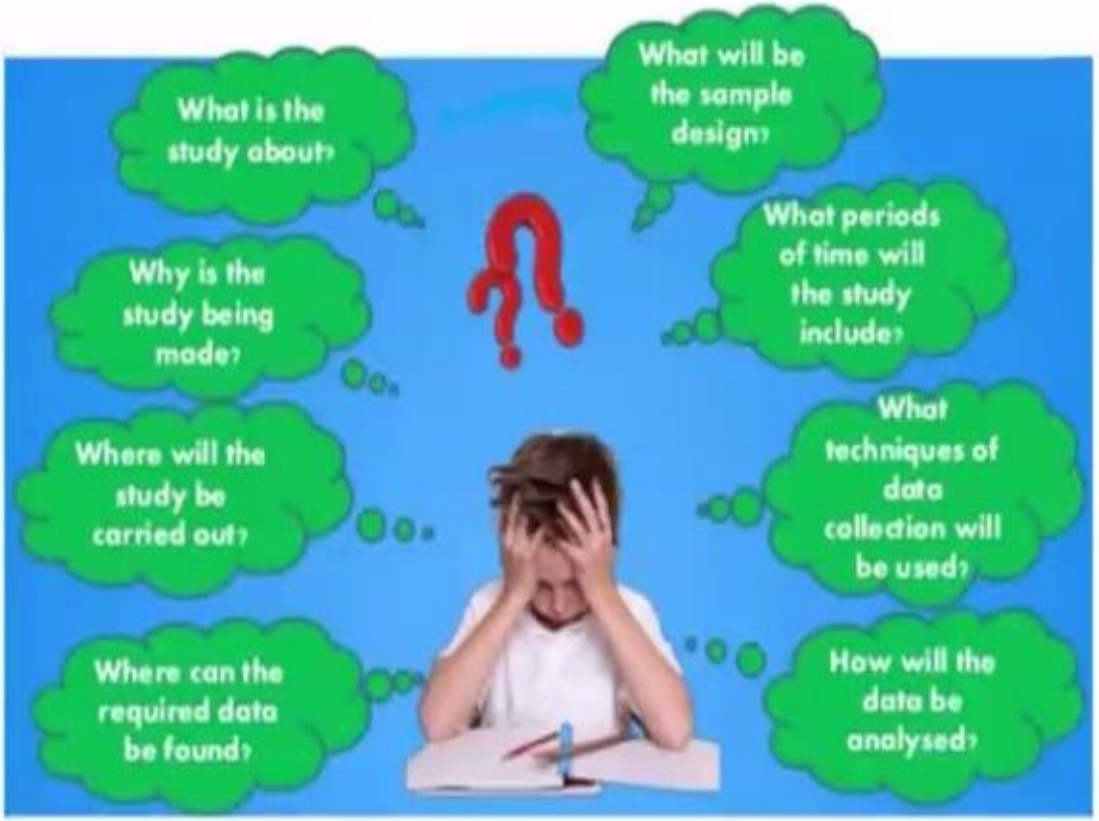
Quantitative Research

- It uses data that can be converted into numerical form to answer 'HOW' questions.
- Quantitative research refers to the systematic empirical investigation of any phenomena via statistical , mathematical or computational techniques.

Research Problem /Topic/Subject

- The research problem undertaken for study must be carefully selected. Help may be taken from a research supervisor/mentor in this connection.
- Ask yourself one key question: Where do you YOUR interests lie?

What?, Why?, Where?, How?



Research Problem/Task

.1.

Something you want to know about your discipline, or about a specific area within your discipline.

Note a topic, fragment, phrase, or sentence. It ends with a question mark (?).

.2.

Research subject can come from insights stemming from:

- Personal experience
- Theory
- Observations
- Contemporary issues
- Engagement with the literature

.3.

It should be:

- Clear
- Focused
- Concise
- Complex
- Arguable

What should be done to- Define a Research Target/Subject?

.1.

Normally, overdone subject should not be picked, because in such a situation, it would be a difficult task to shed some new light.

.2.

There must be some objective(s) to be attained

.3.

The subject selected for research should be familiar and feasible so that the related research material or sources of research are within one's reach.

.4.

The importance of the subject, the qualifications and the training of a researcher, the costs involved, the time factor are few other criteria that must also be considered in selecting a problem.

Before the final selection of a problem, a researcher must ask him/her self the following questions:

- Whether he/she is well equipped in terms of his/her background to carry out the research?
- Whether the study falls within the budget he/she can afford?
- Whether the necessary cooperation can be obtained from those who must participate in research as subjects?

Literature Review

- Once the problem is formulated, the researcher should undertake extensive literature review connected with the problem.
- Literature review is done because it assists in-
  - refining statement of the problem
  - strengthening the argument of selection of a research topic (Justification)
  - getting familiar with various types of methodology that might be used in the study (Design)

Literature Review.....

- A literature review is a systematic and comprehensive account of selected literature already published on a particular research topic.
- It gives an overview to the researcher to discover what is already known about the current research problem and what more can be designed and developed.
- Review of literature is an important step to follow the research process.
- The already established data can be useful for a researcher in comparing the results and findings for their current study.

Thus,

The review of the literature is defined as a broad, comprehensive, in-depth, systematic, and critical review of scholarly publications, unpublished scholarly print materials, audio-visual materials, and personal communications.

Structure a Literature Review in easy way

Literature Review is a foundation step in research process

Define the Research Problem

Review of literature

Formulate Hypothesis

Design Methodology

Experiment/ Collect Data

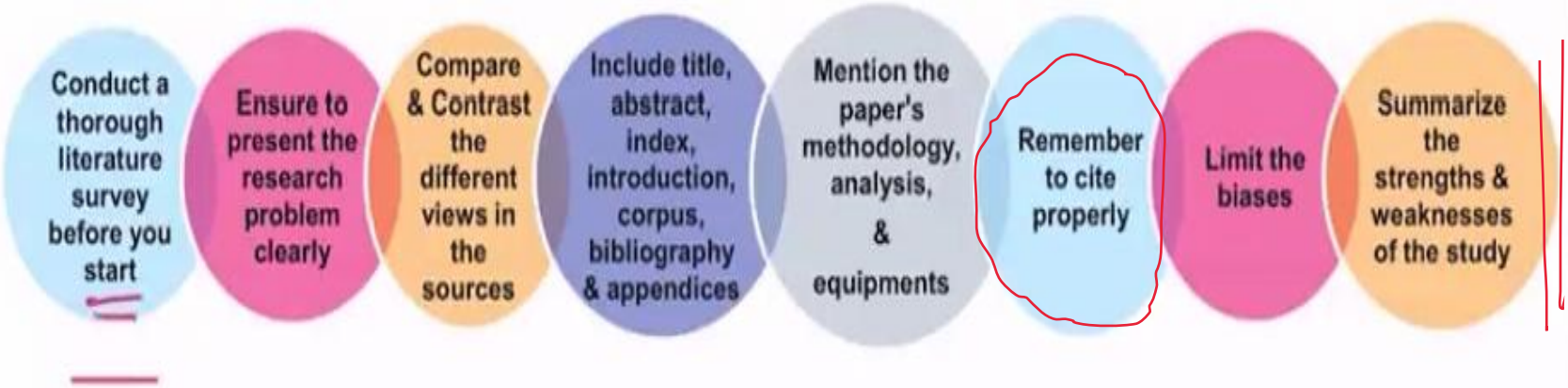
Analyze and Report

Purpose of Literature Review

1. Determines whether proposed research is actually needed or not.
2. It is an account of what is already known about a particular phenomenon.
3. Gives background knowledge of the field under investigation.
4. Helps identify current research gaps and understand where you need to focus your efforts.
5. Provides a knowledge of facts, eminent researchers, and possible research methods in your area.
6. Reviewing literature is a tedious activity, but it is necessary if the process is to be successful.

Literature Review

Guidelines for Writing a Literature Review

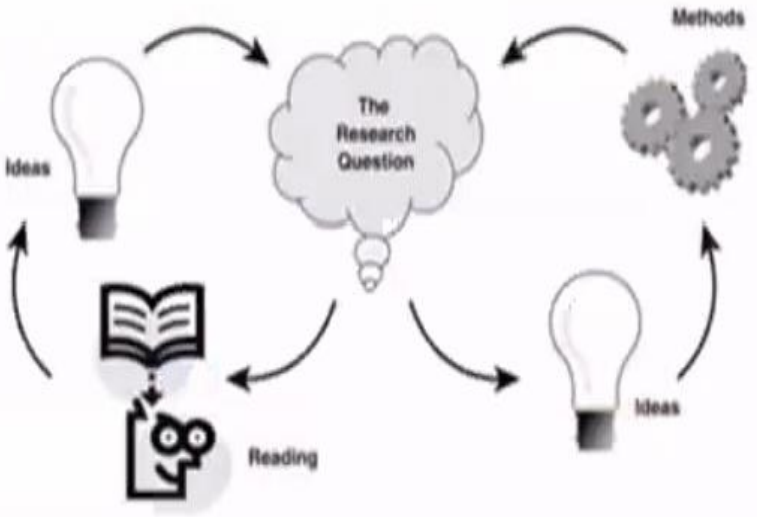


Scientific Literature Review

A scientific literature review is a critical account of what has been published on a topic by accredited researchers.

It may be:

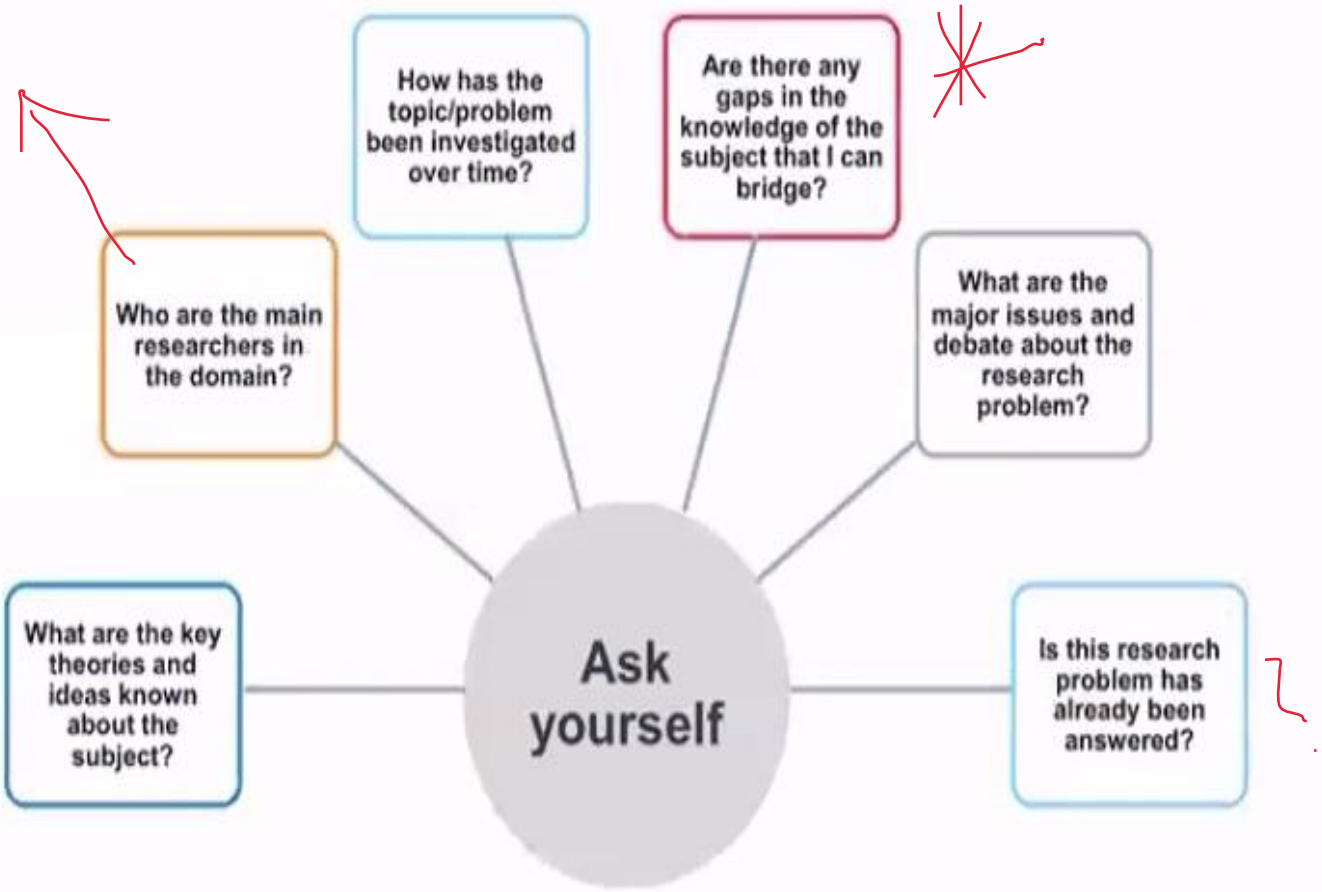
- A stand-alone assignment
- An introduction to an essay, report, thesis chapter, etc.
- Rationale for engaging in primary research
- Part of research/grant proposals



Writing a scientific literature review will:

- Improve your topic knowledge
- Provide insights on your topic to others
- Demonstrate your data search abilities
- Demonstrate your critical analysis skills
- Demonstrate your communication/writing skills

Start with the following questions



Also think about..

- A literature review is a process as well as an outcome!
- Literature review as an outcome: appears in the final draft of your thesis/article as part of your introduction or as a separate chapter.
- Literature review as a process: is a critical engagement (thinking, reading and writing) with relevant research on your topic. It is a crucial and formative stage of your thesis/article journey.

While reading published material, think about:

- What were the research aims of the paper/book?
- Is the research aim achieved? If so, how did they do it?
- Are there any problems with their methodology?
- Was it a strong or a weak research model?
- How is this study going to help with your own research?
- What can you take from it?
- What needs to be avoided?
- What are you doing differently?

Contents of Literature Review

Introduction	Body	Conclusion	References
It establishes the writer's point of view and appropriate context for reviewing the literature on a particular topic.	It includes group research studies, theoretical articles, case studies, conclusions of authors, specific objectives, chronology etc. It also summarizes individual studies or articles and their comparative importance in the literature.	It summarizes major contributions of significant studies and relates the body under review and the focus of the introduction. It also provide some insight into the current topic of the research.	Bibliography or the list of references to be given in appropriate format.

Other Prerequisites of literature review

- Locate different types of resources
- Decide which resources might be suitable
- Select most appropriate resources
- Revise research questions, if necessary

- **Finding too much?** If you find so many citations that there is no end to the number of references you could use, its time to re-evaluate your question. It's too broad/Nothing much to explore
- **Finding too little?** On the other hand, if you can't find much of anything, ask yourself if you're looking in the right area/direction.
- **Take thorough notes.** Be sure to write copious notes on everything as you proceed through your research.
- **Look for references to papers** from which you can identify the most useful journals.
- **Identify those authors** who seem to be important in your subject area.

Sources of literature

Books
- Text books
- Monographs
- Edited collections

Journal Articles
- Academic journals
- Conference Proceedings

Indexing and Abstracting journal search engines
- Pubmed
- Google Scholar

Media
- Newspaper
- Magazine

Past Dissertations/ thesis

Vital statistics
- Census
- Government Records (NIC)
- Surveillance system
- Surveys

International organization documents
- e.g. (WHO,UNICEF)

Internet

Institutional Library

- Institutional library serves as a greatest source of literature review
- Our University (DAVV) library subscribes International/Foreign and Indian Journals in various specialties
- The library has a exclusive collection of numerous Thesis and Dissertations of PhD students.

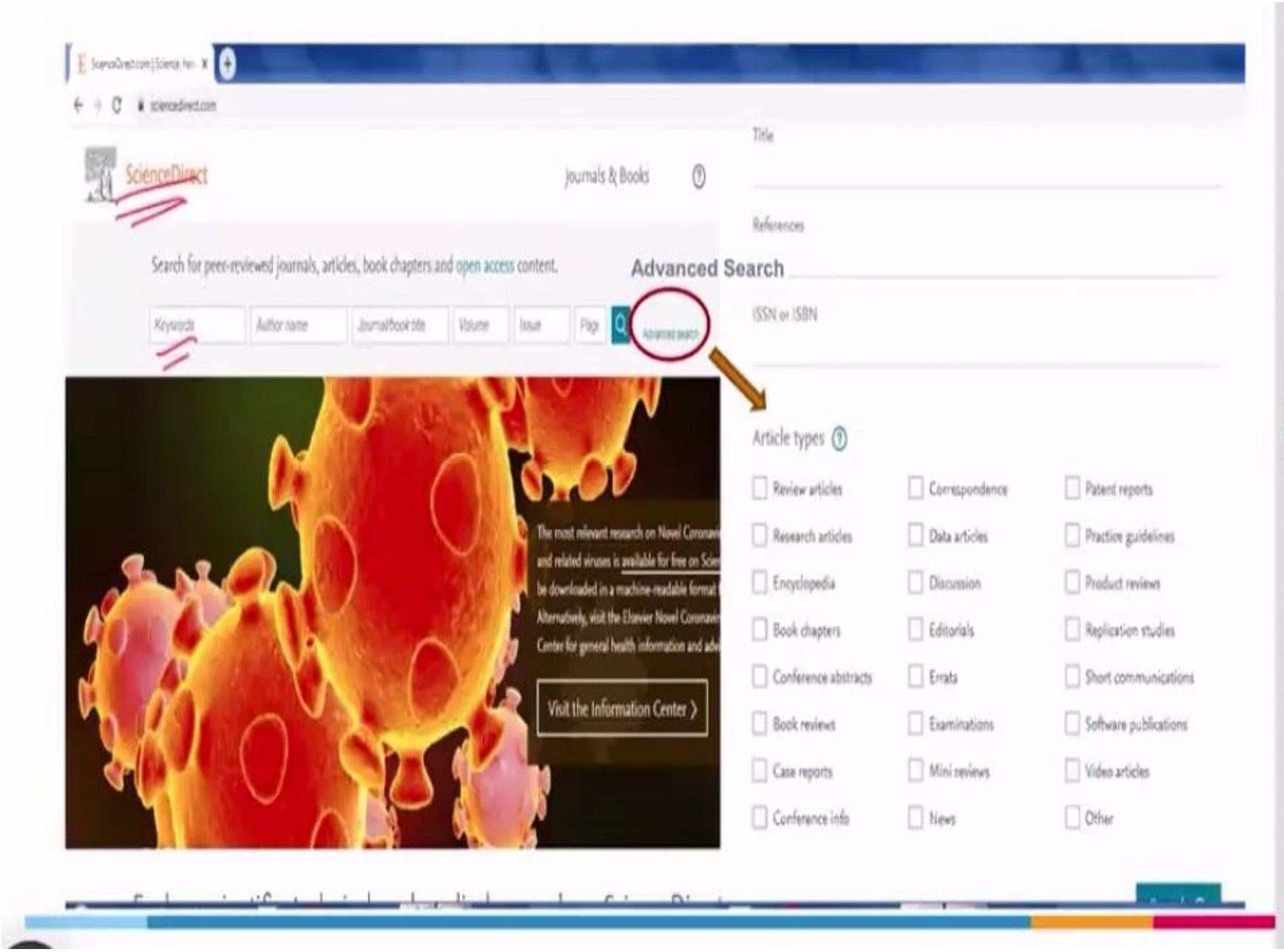
Websites for Scientific/ Research material

- Science Direct (Elsevier)
- American Chemical Society (ACS)
- Royal Society of Chemistry (RSC)
- Sci-Hub (removing barriers in the way of science)
- Springer
- Elsevier
- Wiley
- Taylor & Francis ..... and many more

ACS
RSC

Useful websites

- **PubMed Central** -is the National Library of Medicine's database of free, full-text medical articles made available by contributing publishers.
- **ScienceDirect** - is a part of Elsevier, a publisher of scientific, technical and medical information provider. It is an online collection of published scientific research, including over 2500 journals and 6000 books
- **Sci-Hub** - Can search a research paper of choice through DOI number / other details
- **Medline** - Major bibliographic database for biomedical sciences
- **Embase** - An extensive biomedical and pharmaceutical database from Elsevier.
- **Proquest** – Database for biomedical sciences
- **Medscape** - Provides the latest medical news, clinical trial coverage, drug updates, journal articles, CME activities & more.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Search for peer-reviewed journals, articles, book chapters and open access content.
Keywords
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Case reports
Conference info
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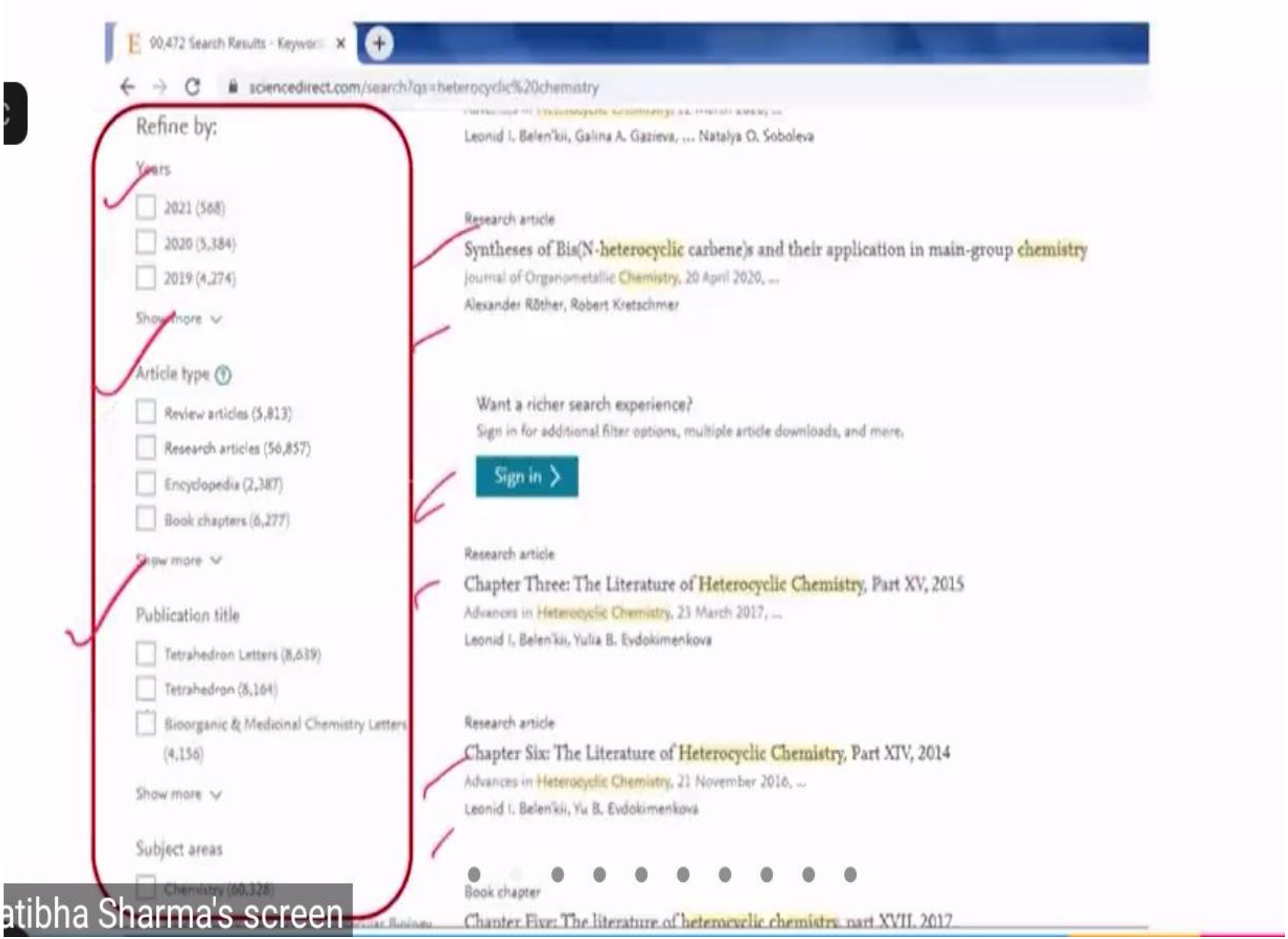
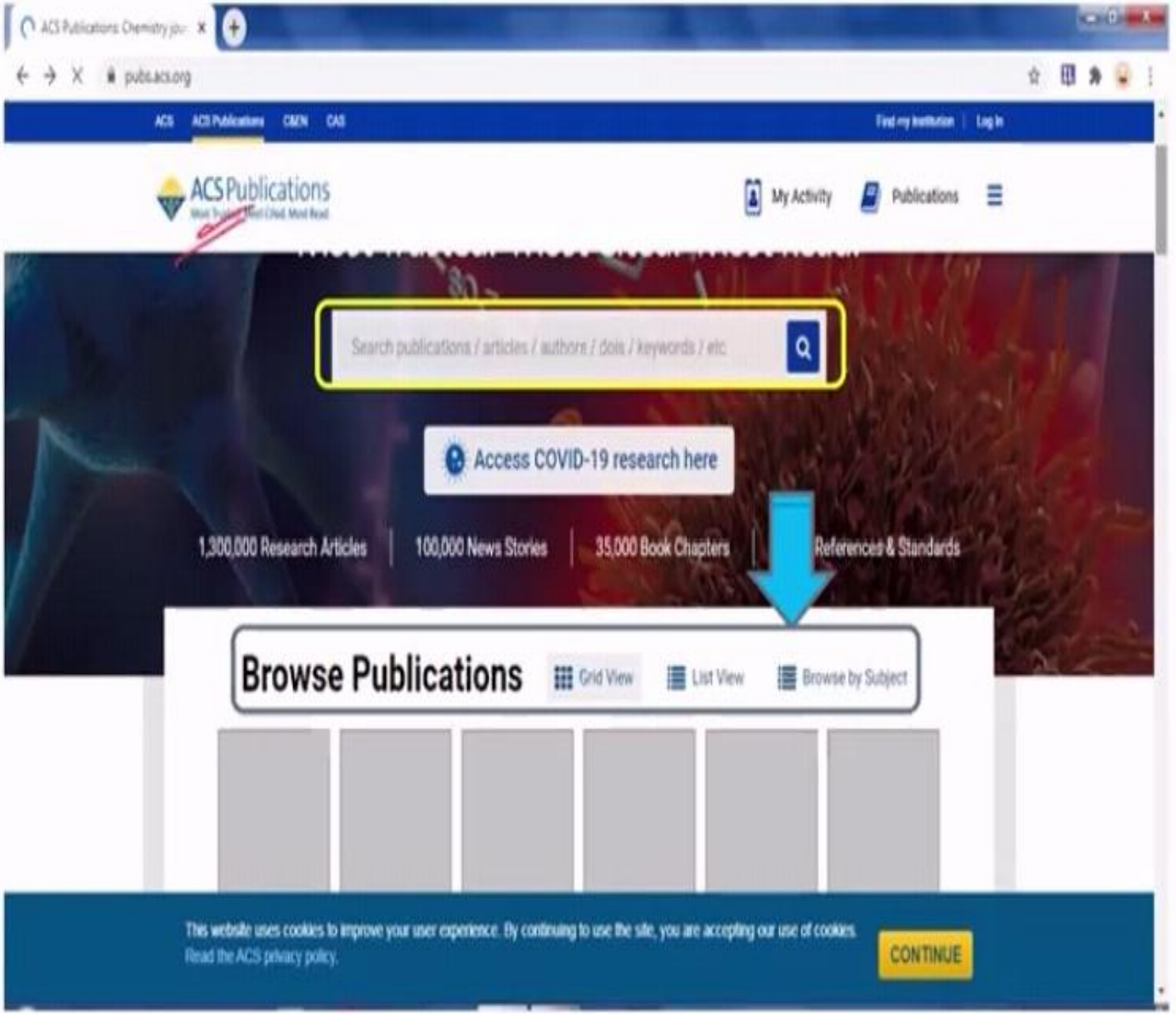
Errata
Examinations
Mini reviews
News
Patent reports
Practice guidelines
Product reviews
Replication studies
Short communications
Software publications
Video articles
Other

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The Chemical Society of Japan holds the national meeting annually in Spring, which covers all academic fields in Chemistry.
PACIFICHEM
The 101st CSJ Annual Meeting (2021)
Online Meeting
March 19 (Fri.) - 22 (Mon.), 2021
Organized by : The Chemical Society of Japan
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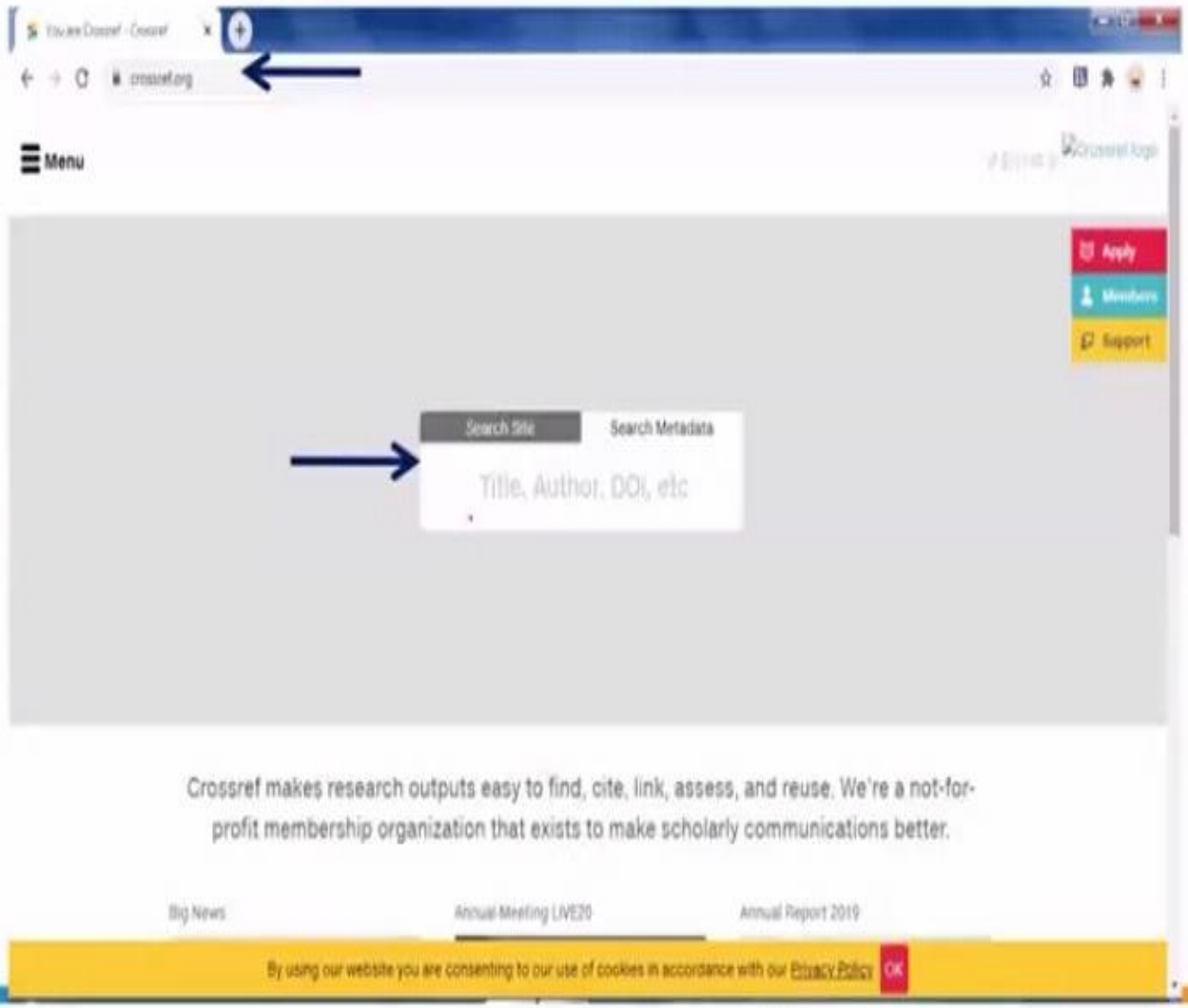
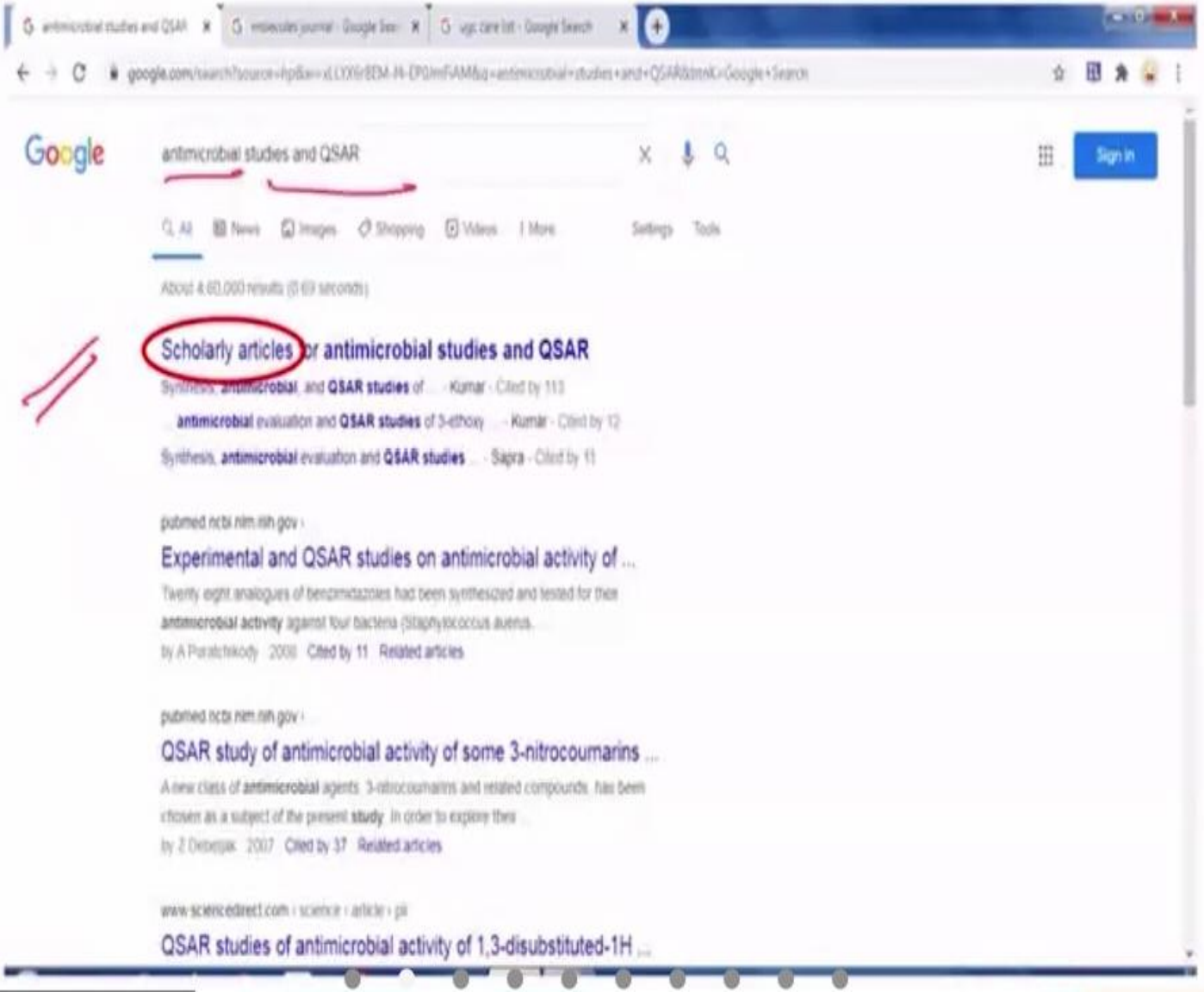
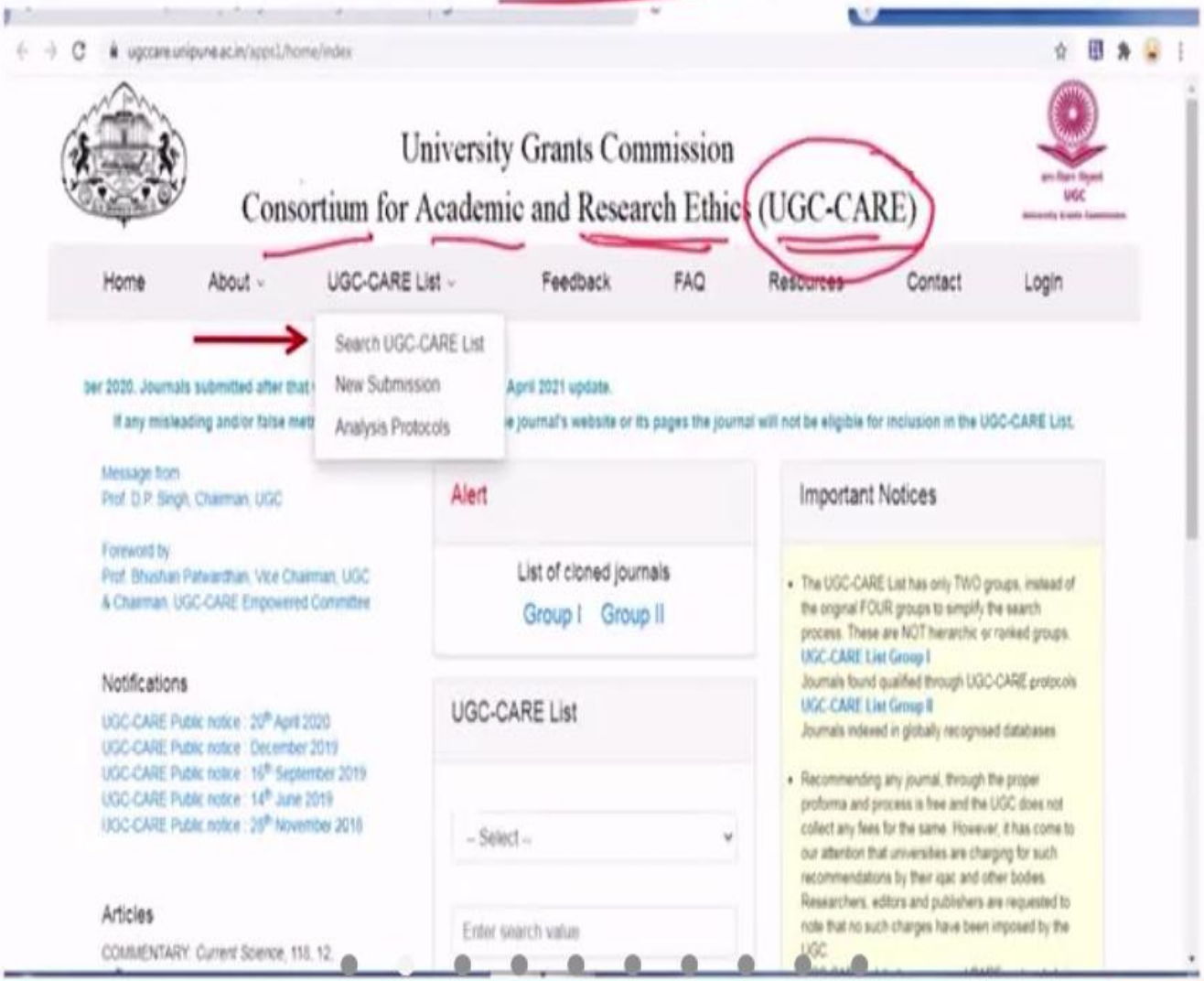
Instant way to find a publication



The most commonly visited webpage

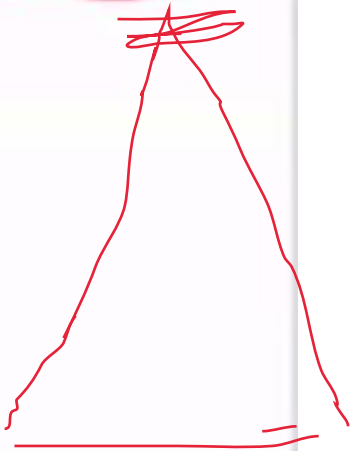


Always be alert of fake journals



Characteristics of good literature review

- It should be well written.
- It should be organized and systematic:
  - Include broad-based research first and then focus on specific studies that relate to the topic
  - Organize the literature by the dates the research was published
  - Organize the review so that it moves from the problem to the solution
- It should be free from bias.
- It should include up-to-date references:
  - All sources cited in the literature review should be listed in the references.
- It should be logical and empirical.



Points to be remembered

- Be specific and selective.
- Focus on current topics.
- Simple and accurate sentence structure.
- Referring original source.
- Ensure evidence/data for claims.
- Focus on sources of evidences/data.
- Account of contrary evidences/data.

Types of References

- Journal Reference
- Book Reference
- Internet Reference

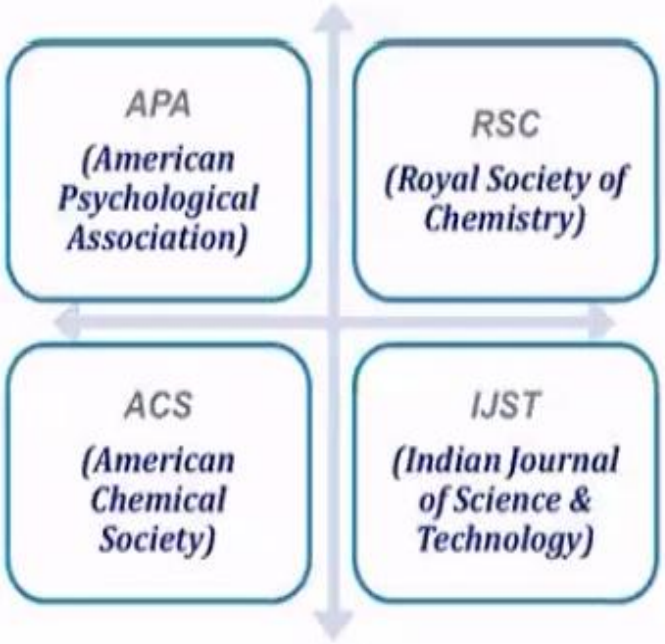
- Reference Elements
- Authors name
- Article title
- Journal Name
- Year
- Volume
- Page numbers

- **Reference**: a list of sources we have cited in our text arranged in the order they appeared within the text. It is usually put at the end of our work but it can also appear as a footnote (at the bottom of the page), or end note (at the end of each chapter) which serves a similar purpose.

- **Bibliography**: a separate list of sources we have consulted but not specifically cited in our work including background reading. It is arranged alphabetically by the author's surname.

What is a Citation?

- A citation is a way of giving credit to individuals for their creative and intellectual works that you utilized to support your research.

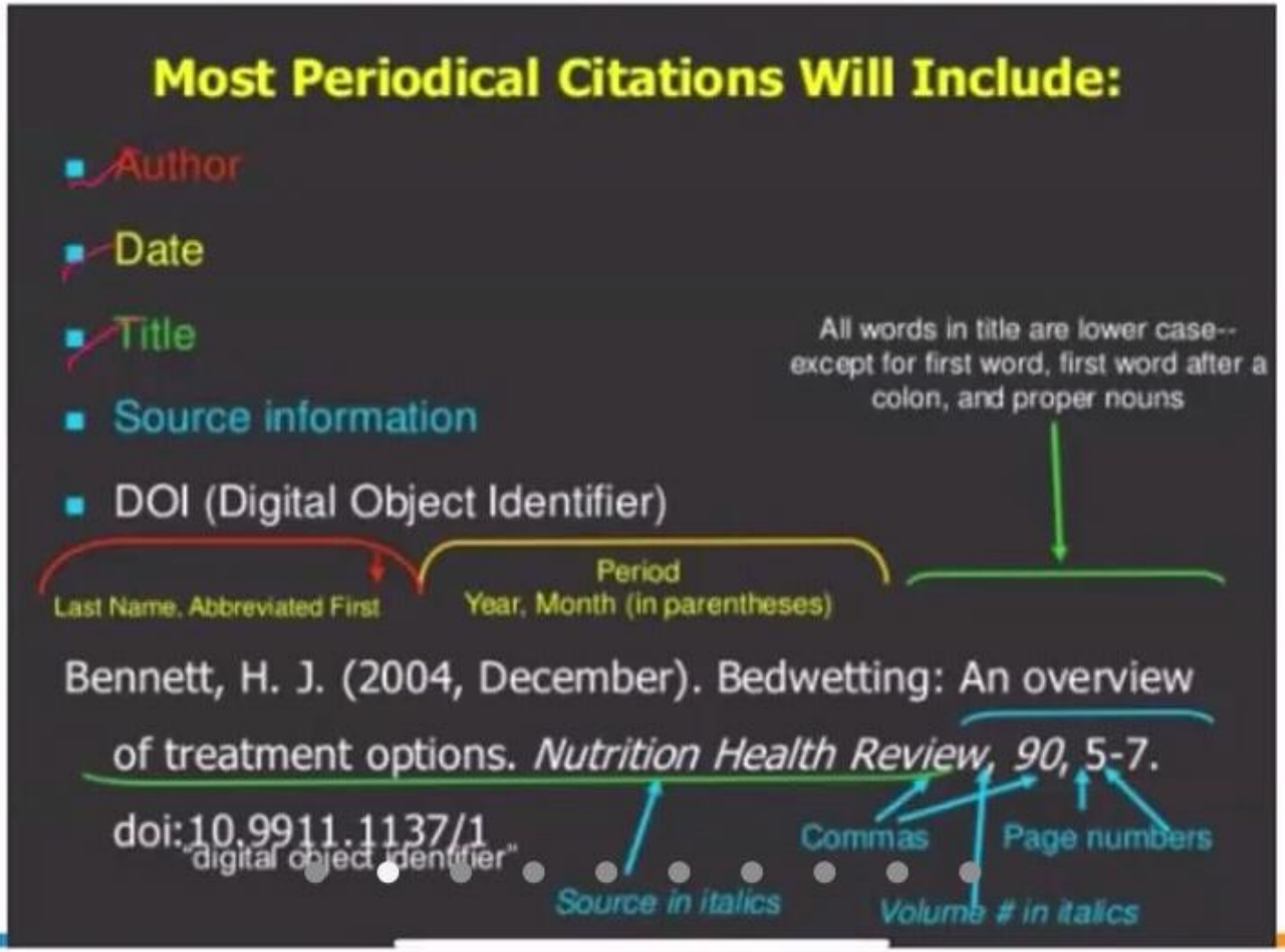


APA (American Psychological Association)

- There are **2 ways to cite** according to APA style:
  - Brief **In-text citations** (often in parentheses) within the body of essay or paper.
  - List of **full citations** in the Reference section at the end of your paper.

Author's name followed by its initials. (Year of Publication). Article title followed by full stop. Name of Journal in italic form. Volume followed by a comma, Pages No.

Example: Alibali, M. W., Phillips, K.M. & Fischer, A.D. (2009). Learning new problem-solving strategies leads to change in problem representation. *Cognitive Development*, 24, 89-101.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Source information
DOI (Digital Object Identifier)
All words in title are lower case-- except for first word, first word after a colon, and proper nouns
Last Name, Abbreviated First
Period
Year, Month (in parentheses)
Bennett, H. J. (2004, December). Bedwetting: An overview of treatment options. Nutrition Health Review, 90, 5-7.
doi:10.9911.1137/1
"digital object identifier"
Source in italics
Commas
Volume # in italics
Page numbers

Books : What Should Be Included?

Author(s) or Editor(s).
(Date of publication).
Complete title.

Edition (if indicated).
Place of publication:
Publisher.
DOI (if available).

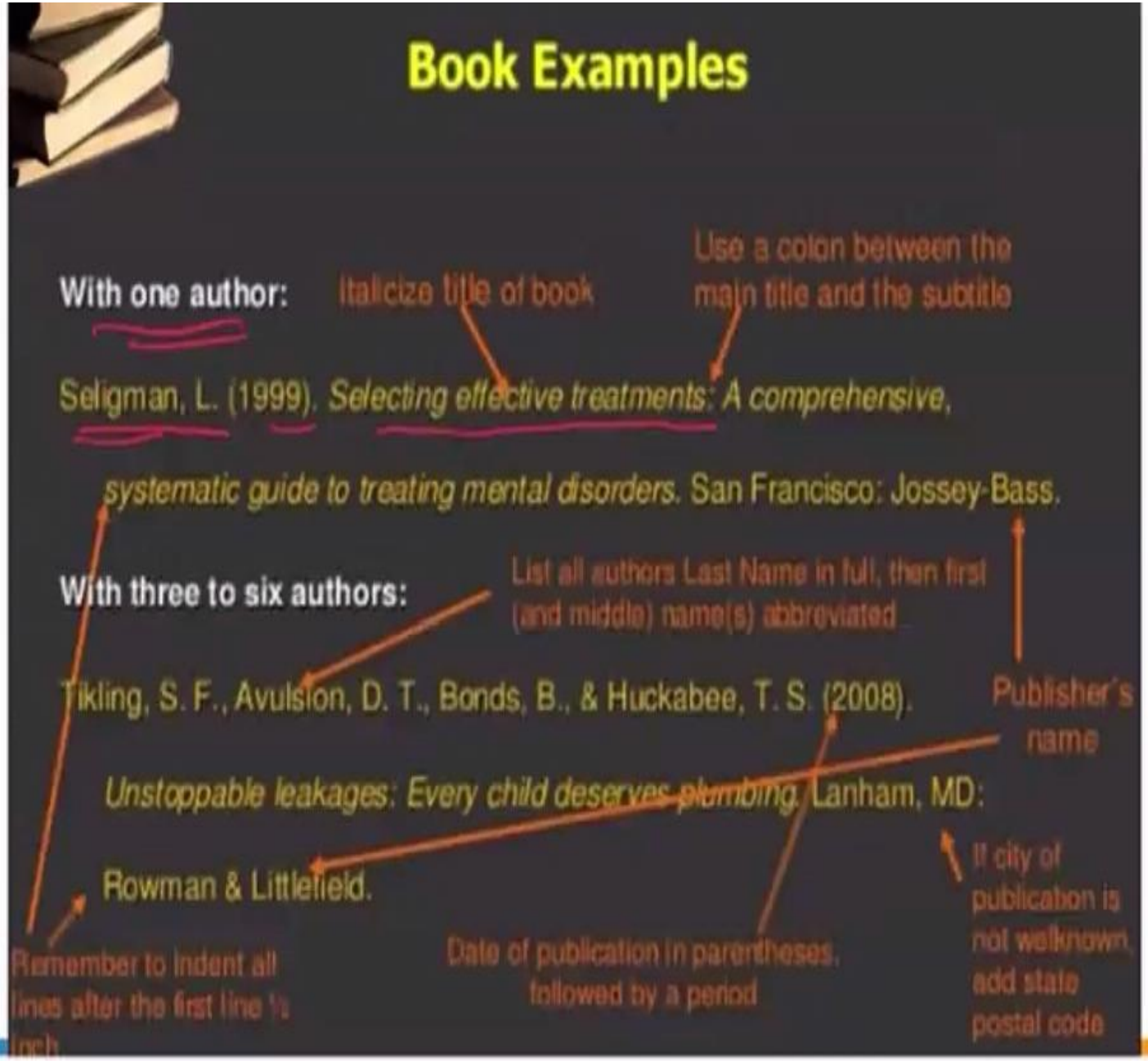
Butler, R. J., Green, D., & Procter, H.

(2007).
Child within: Taking the young person's perspective by applying personal construct psychology.
(2nd ed).

Chichester, England:

Wiley & Sons.

10.1007/978-1-84882-023-4


Book Examples
With one author:
Italicize title of book
Use a colon between the main title and the subtitle
Seligman, L. (1999). Selecting effective treatments: A comprehensive, systematic guide to treating mental disorders. San Francisco: Jossey-Bass.
With three to six authors:
List all authors Last Name in full, then first (and middle) name(s) abbreviated
Tikling, S. F., Avulsion, D. T., Bonds, B., & Huckabee, T. S. (2008).
Publisher's name
Unstoppable leakages: Every child deserves plumbing. Lanham, MD:
Rowman & Littlefield.
If city of publication is not well known, add state postal code
Remember to indent all lines after the first line ½ inch
Date of publication in parentheses, followed by a period

RSC (Royal Society of Chemistry)

INITIALS. Author's surname, Title of Journal (abbreviated in italics), Year of Publication, Volume Number (In Bold), Pages No.

Example:

H. Yano, K. Abe, M. Nogi, A.N. Nakagaito, *J. Mater. Sci.*, 2010, **45**, 1-33.

ACS (American Chemical Society)

Author's surname. INITIALS.; Title of Publication. Title of Journal (abbreviated in italics). Year of Publication (In Bold). Volume Number (In Italics). Pages No.

Example:

Demchuk, Z.; Wu, N.; Pourhashem, G.; Voronov, A. S. Life Cycle Environmental Impact Considerations in the Design of Soybean Oil-Based Acrylic Monomers. *ACS Sustainable Chem. Eng.* **2020**, *8*, 12870– 12876.

APS

OSA

Author's surname. INITIALS.; Title of Publication. Title of Journal (abbreviated in italics). Year of Publication (In Bold). Volume Number (In Italics). Pages No.

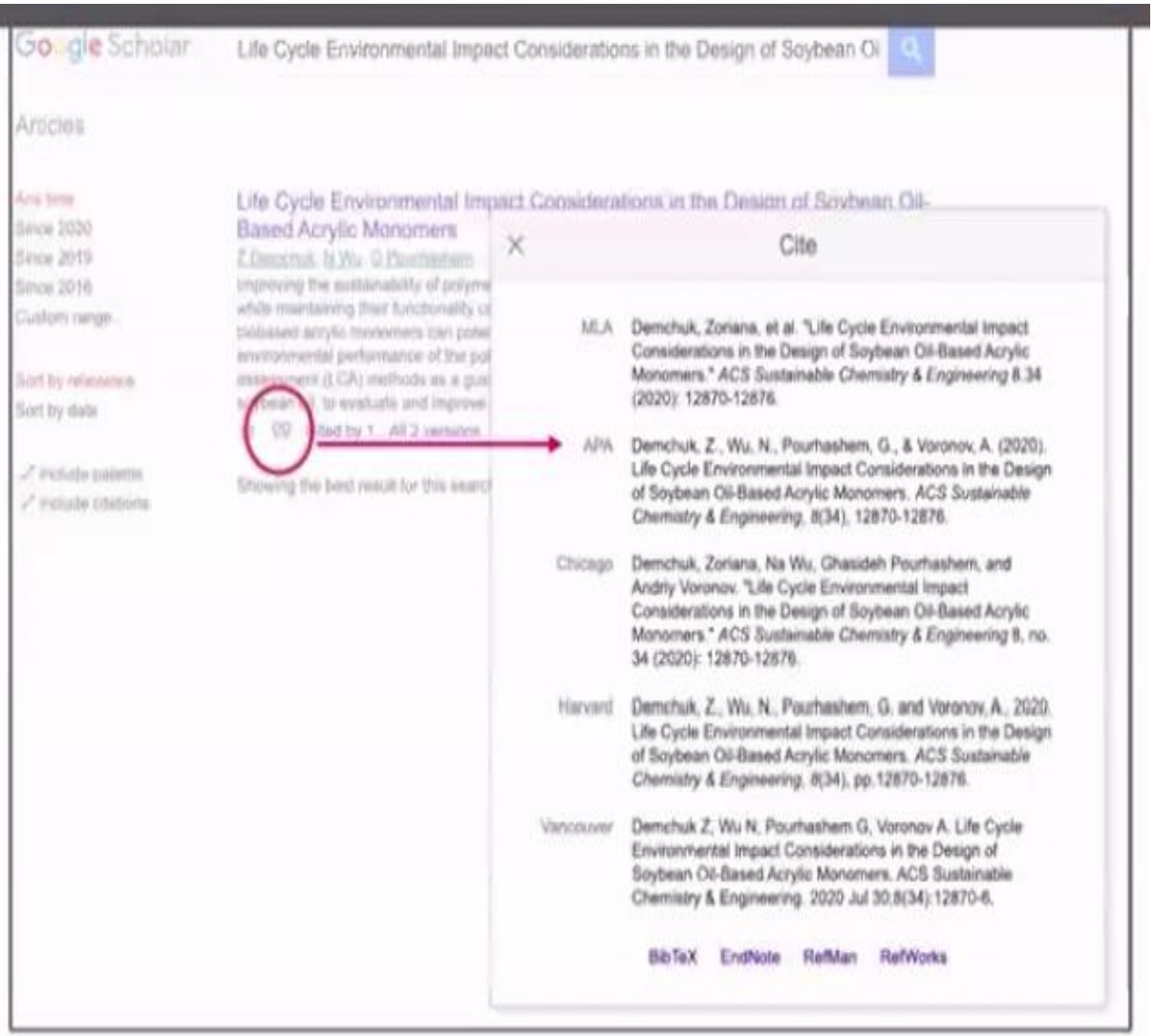
Example:

Demchuk, Z.; Wu, N.; Pourhashem, G.; Voronov, A. S. Life Cycle Environmental Impact Considerations in the Design of Soybean Oil-Based Acrylic Monomers. *ACS Sustainable Chem. Eng.* **2020**, *8*, 12870– 12876.

Some easy ways of Citations:

.1. Google Scholar

Use Google Scholar's citation symbol for the APA style



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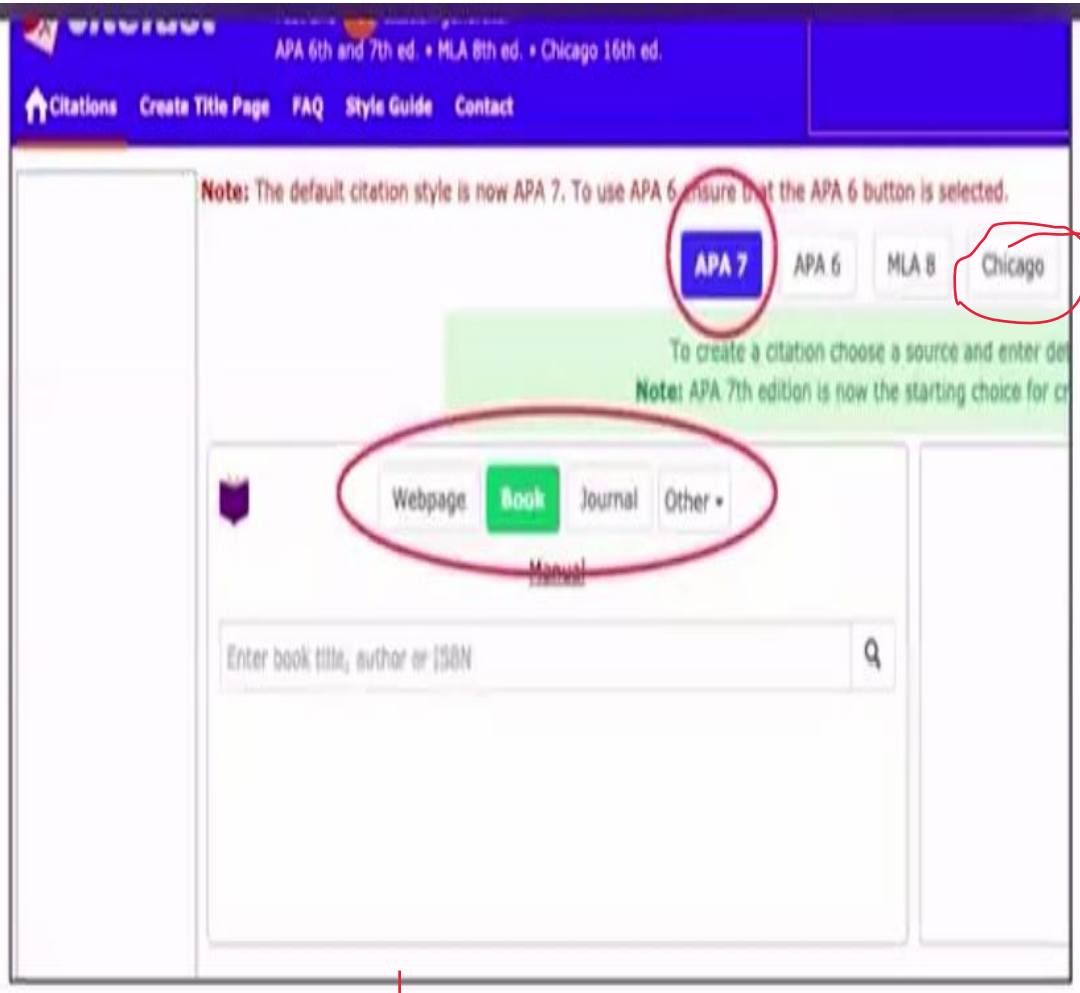
Some easy ways of Citations:

.2. citefast.com

Use citefast.com's search engine for the APA style for websites, books, journals etc.



H/W

Some easy ways of Citations:

.3. SCI-HUB

It is a shadow library website that provides free access to millions of research papers and books, without regard to copyright

Impact Factor

Impact Factor (IF): Impact Factor was developed by Eugene Garfield as a quantitative method for comparing the journals. He together with Irving H. Sher, proposed IF in 1955 to rank the journals according to the journal citation.

- It is a measure of the frequency with which the "average article" in a journal has been cited in a particular year or period.
- The impact factor of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years.
- **Let us assume that the total number of articles published in a journal in 2010 and 2011 are 50 (Denominator) and in 2012, the citation to everything published in 2010 and 2011 is 500 (Numerator). The IF of will be 10 in 2013. – Impact Factor is calculated after 3 years of journal launch. New journals should not be expected to have IF from day 1.**
- Thomson Reuters, ISI releases Journal Citation Reports every 2 years and publishes IF of every journal.
- Impact Factor, once assigned by Thomson Reuters to a journal, will be eligible from the date of its birth.

Indexing (Citation index)

Citation indexing makes links between books and articles that were written in the past and articles that make reference to ("cite") these older publications.

- Many commercial indexing services are available.
- Quality indexing services include PubMed, Scopus, Web of Science, Google scholar, etc.
- A good indexing body ensures that:
  - Journal should have content of high quality
  - Journal should follow peer-review process
  - Subject matter of the journal should be compatible with the scope of Indexing body
  - Journal should have a disciplined publishing history.

h-index

- It is defined as the number of papers with citation number equal to or greater than h, as a useful index to characterise the scientific output of a researcher (Hirsch, 2005)

- It takes into account 2 things:
  - The researcher's PRODUCTIVITY (no. of publications a researcher has produced)
  - The IMPACT of the researcher's publications (how many citations the researcher's publications have received)

How to find h-index?

- You can manually calculate a researcher's **h-index** by gathering a list of all their publications, listing them in order of citation counts and then finding the point at which the highest no. of papers **(h)** have been cited at least **h** time each.

- A number of research databases calculate the **h-index** for you.

Example-1: **Scopus**

1. Do Author search and click then click on the name
2. H-index is provided underneath the research heading (a no. of other indicators of research output are also provided here)

Example-2: **Web of Science**

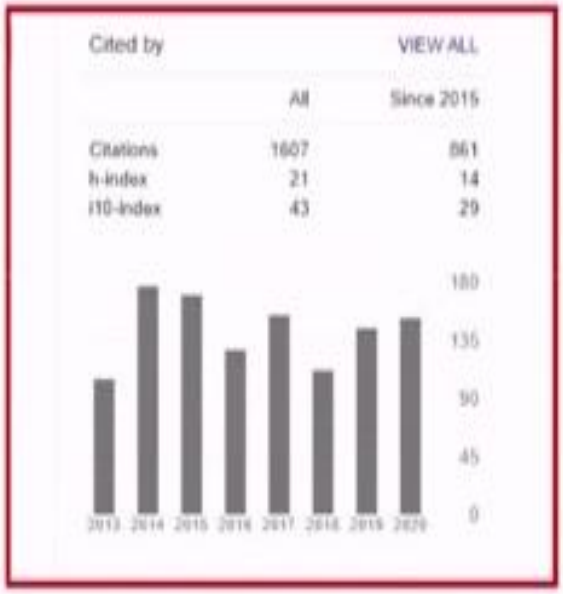
1. Search for researcher's name and select the Author from drop down menu
2. Click 'create citation report'

Example-3: **Google Scholar**

1. Google Scholar Profile (only when the researcher has created one)
2. If no scholar profile, download 'Publish or Perish' and use it to calculate a researcher's h-index using the data

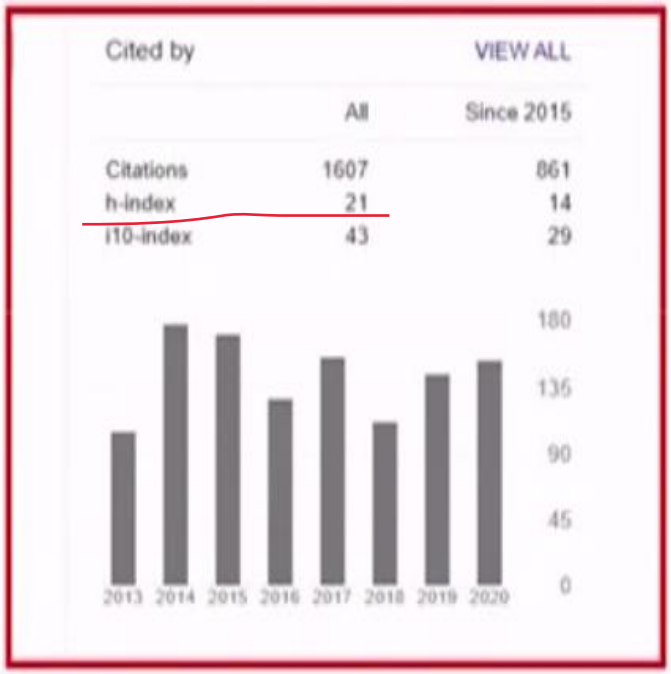
h-index

Paper	Number of citations
Paper 1	101
Paper 2	86
Paper 3	77
Paper 4	56
Paper 5	16
Paper 6	12
Paper 7	8
Paper 8	4
Paper 9	4
Paper 10	1



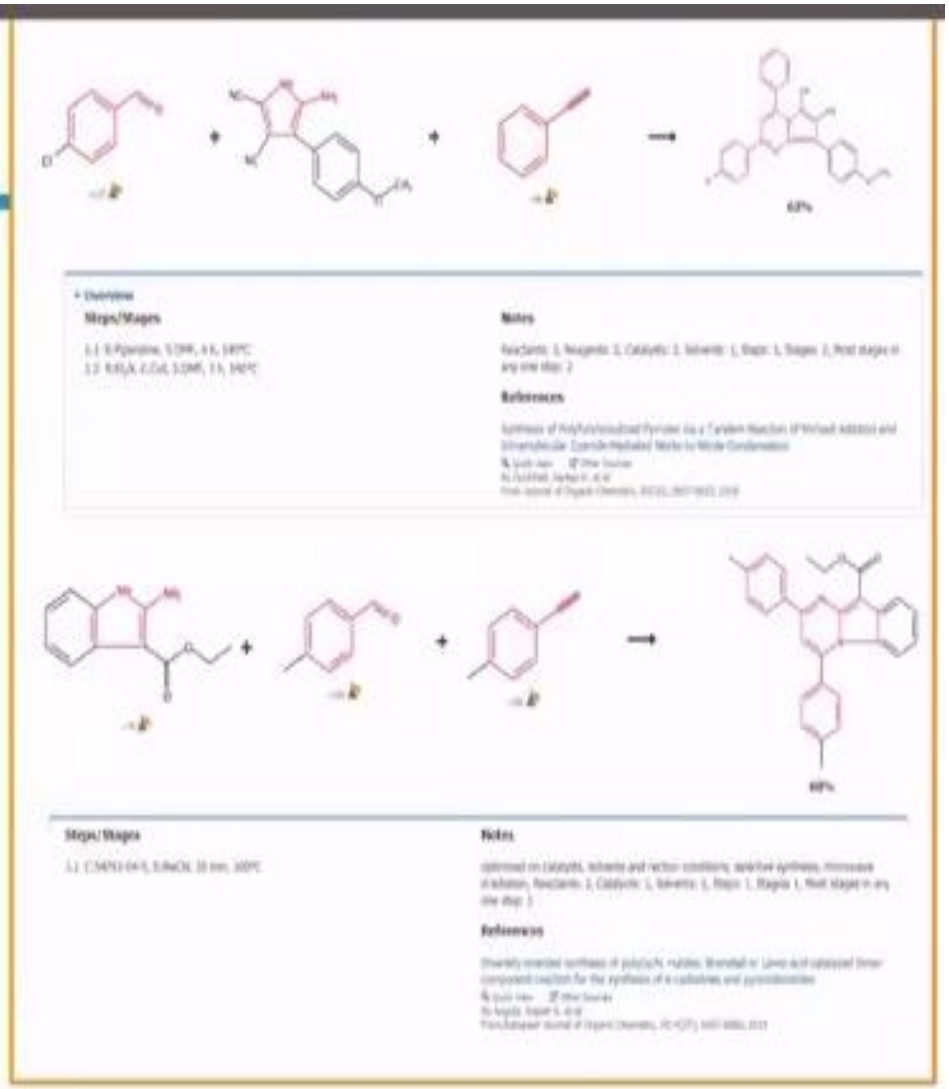
h-index

Paper	Number of citations
Paper 1	101
Paper 2	86
Paper 3	77
Paper 4	56
Paper 5	16
Paper 6	12
Paper 7	8
Paper 8	4
Paper 9	4
Paper 10	1



SciFinder Search

- Sci-Finder, a resource from the Chemical Abstracts Service (CAS), is a curated database of chemical and bibliographic information that covers several scientific and biomedical fields, with an emphasis on chemistry.
- Sci-Finder contains a wide variety of content from journal articles to information on chemical structures, properties, and reactions. There are three separate search sections in SciFinder: references, substances, and reactions.



Proof-reading and Plagiarism checking

Editing and proofreading are fundamental aspects of good academic practice.

- **Editing** is the process of continually revising and improving your written work. It is often an activity that forms a major part of the writing process.
- **Proofreading** is the final check before printing and submission. It is a process that helps remove errors and improve presentation.

Plagiarism includes:

1. Using another writer's words without proper citation
2. Using another writer's ideas without proper citation
3. Citing a source but reproducing the exact word without quotation marks
4. Borrowing the structure of another author's phrases/sentences without giving the source
5. Borrowing all or part of another student's paper
6. Using paper-writing service

Commonly made errors

- Review is not logically organized
- Review is not focused on most important facets of the study
- Review does not relate literature to the study
- Too few references or outdated references cited
- Review is not written in author's own words
- Review reads like a series of disjointed summaries
- Review does not argue a point
- Recent references are omitted

Correct way:

After reviewing the literature, summarize what has been done, what has not been done, and what needs to be done

Remember you are arguing your point of why your study is important!

Then pose a formal research question or state a hypothesis—be sure this is clearly linked to your literature review

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Revisiting- Research Problem

Research:

- The systematic, rigorous investigation of a problem in order to generate new knowledge or validating existing knowledge.
- It is an endeavor to discover new facts by the scientific study of a subject by a course of critical investigation.

Research Question:

- Something you want to know about your discipline or about a specific area within your discipline.
- A 'Research Question' should be an issue that you are genuinely curious about.
- An idea for your research problem can come from insights when you engage with a lot of literature, observations and published facts.
- Research problem should be clear, focused and arguable.

Research Methodology

Research Methodology:

- It is the master plan specifying the methods and procedures for collecting and analyzing the needed information.
- It yields maximum information and saves effort, time and money.

Research Method vs Methodology:

- Research **Methods** are the techniques and methods adopted by a researcher for conducting the research.
- Research **Methodology** is the way in which research problems are solved systematically and scientifically.

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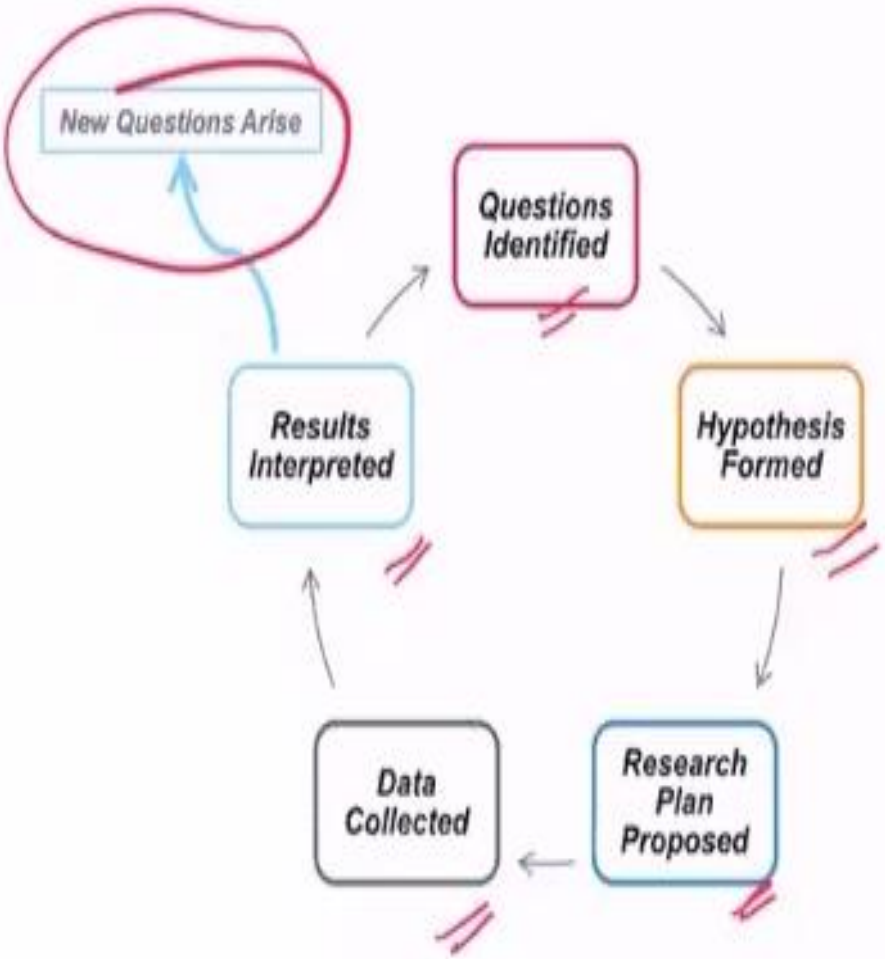
Logical steps of Research



In an ideal world:

Hypotheses (On the platform)

Theories (Seated)

Laws (Running)

Criteria of Good Research

Systematic

Research is structured with specified steps to be taken in a specified sequence in accordance with the well defined set of rules.

Logical

Research is guided by the rules of logical reasoning

Empirical

Research is related basically to one or more aspects of a real situation and deals with concrete data that provides a basis for external validity.

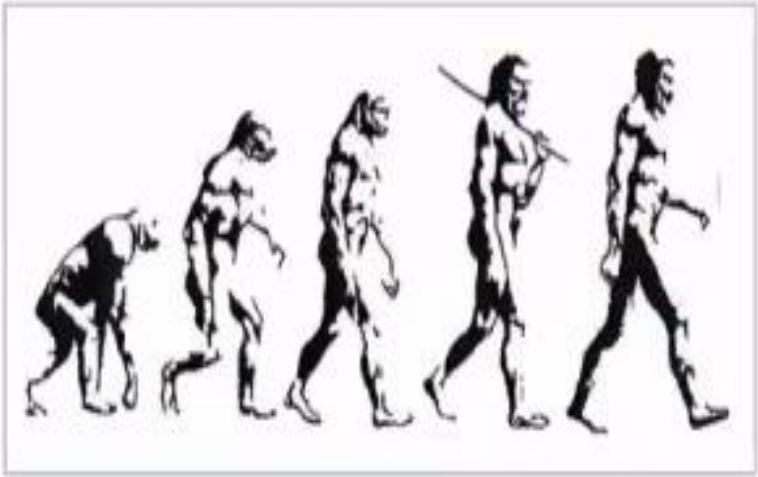
Replicable

This characteristic allows research results to be verified by replicating the study and thereby building a sound basis for decisions.

Criteria of Good Research

1. Research design is thoroughly planned.
2. Purpose is clearly defined.
3. High ethical standards are applied.
4. Limitations are frankly revealed.
5. Findings are presented clearly.
6. Conclusions are justified.
7. Adequate analysis is done.
8. Research process is detailed.
9. Researcher's experience is reflected.

Not something you do now and forget about...
Remember your field is constantly evolving and changing...



Review of Literature

(Ph.D. Course Work)

On

A COMPREHENSIVE SYNTHETIC ACCOUNT OF FUSED IMIDAZOLE SCAFFOLDS: A REVIEW

Submitted By

Ms. Deepika Geedkar

Under the supervision of

Dr. Pratibha Sharma

School of Chemical Sciences

Devi Ahilya Vishwavidyalaya, Indore

(M.P.)

(May, 2019)

1

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TITLE: REVIEW OF LITERATURE ON SYNTHESIS OF FUSED IMIDAZOLE DERIVATIVES

1. INTRODUCTION

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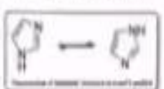
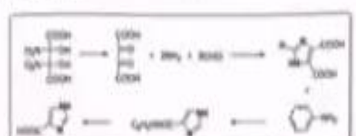
2. CHEMISTRY OF AZOLES

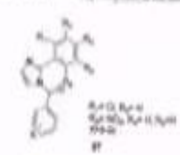
4

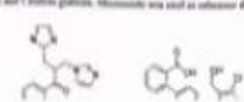


3. REVIEW OF LITERATURE ON SYNTHESIS OF FUSED IMIDAZOLE DERIVATIVES



4. REVIEW OF LITERATURE ON PHARMACOLOGICAL ACTIVITIES OF IMIDAZOLE SCAFFOLDS AND ITS ANALOGUES





6. REFERENCES

Recent advances on the transition-metal-catalyzed synthesis of imidazopyridines: an updated coverage

Gagandeep Kour Reen, Ashok Kumar and Pratibha Sharma*

Review

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Beilstein J. Org. Chem. **2019,** *15,* 1612–1704.
doi:10.3762/bjoc.15.165

Received: 27 February 2019
Accepted: 28 June 2019
Published: 19 July 2019

Associate Editor: L. Ackermann

Keywords:
C–H activation/functionalization; coupling reactions; imidazopyridines; multicomponent reactions; transition metal catalysis

Abstract

A comprehensive account of recent advances in the synthesis of imidazopyridines, assisted through transition-metal-catalyzed multicomponent reactions, C–H activation/functionalization and coupling reactions are highlighted in this review article. The basic illustration of this review comprises of schemes with concise account of explanatory text. The schemes depict the reaction condi-ng with a quick look into the mechanism involved to render a deep understanding of the catalytic role. At some instances ions of certain features have been illustrated through tables, i.e., selectivity of catalyst, loading of the catalyst and percent-ld with different substrates. Each of the reported examples has been rigorously analyzed for reacting substrates, reaction conditions and transition metals used as the catalyst. This review will be helpful to the chemists in understanding the challenges as-

Conclusion

- A good review of literature is the foundation of a good research.
- A literature review is an account of previous efforts and achievements of researchers on a phenomenon.
- Review helps to compare with the other previous studies.

Research inculcates scientific and inductive thinking and promotes the development of logical habits of thinking and organization.

"All progress is born of inquiry. Doubt is often better than over-confidence, for it leads to inquiry, and inquiry leads to invention"

– Hudson Maxim