

VEE (Research Skills Development)

Introduction to Research



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14-yr-old girl discovers magic of 'Om'

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(Representative image)

KOLKATA: A 14-year-old has wowed city scientists with her discovery of the impact of the 'Om' sound in reducing fatigue. Anwesha Roy Chowdhury, a Class-IX student of Adamas World School, topped the recently held Science Congress organized by the state government.

Her findings that chanting of 'Om' increases oxygen level in blood and lowers carbon dioxide and lactic acid, which reduces the level of fatigue, were vetted by physics and physiology professors of Calcutta University and

<http://postcard.news/14-year-old-girl-conducts-experiments-benefits-chanting-om-know-discovered/>

What is Research?

- Noun - “the systematic investigation into and study of materials and sources in order to establish facts and reach new conclusions.”
 - Verb - “investigate systematically”
- <https://en.oxforddictionaries.com/definition/research>

WAKE UP DELHI



<http://www.mensxp.com/special-features/today/28554-dear-car-owners-here-s-why-delhi-s-new-odd-even-car-rule-is-actually-a-great-idea.html>



Research helps you in ...

- Learning how to develop researchable questions
- Developing problem-solving skills and resourcefulness
- Contributing to the creation of new knowledge
- Exploring opportunities in a field
- Preparing for graduate or professional school
- Adding an accomplishment to enhance your resume
- ...

What can you do with research?

- Categorize - forming a typology of objects, events or concepts
 - Describe - observe and describe phenomena, process, ...
 - Explain - a complex issue, situation, ...
 - Evaluate - quality of objects, events, processes, ...
 - Compare - two or more contrasting cases, processes, ...
 - Correlate - relationship between two phenomena
 - Predict - future behavior or events based on the past
 - Control - an event, a process, or a behavior ...
- Walliman, N. (2010). *Research methods: The basics*. Routledge.

Examples of Research Questions

- How are the Internet banking customers are users addressing security issues in India?
- Do females age 18-25 score higher than males age 18-25 in math tests?
- To what extent a dedicated lane for buses affect the traffic flow in metropolitan cities?

Exercise - Research Questions on Social Media and Networks

1. Categorize
2. Describe
3. Explain
4. Evaluate
5. Compare
6. Correlate
7. Predict
8. Control



What Makes a Good Research Question

- A research question guides and centers your research. It should be clear and focused, as well as synthesize multiple sources to present your unique argument.
 - The research question should ideally be something that you are interested in or care about. Be careful to avoid the “all-about” paper and questions that can be answered in a few factual statements.
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- https://twp.duke.edu/uploads/media_items/research-questions.original.pdf

Types of Research Questions

| Main Types of RQs | Answers |
|-------------------|---|
| Exploratory | Answers give clearer understanding, better definitions of concepts, evidence that we can measure them validly |
| Base-rate | Answers describe the normal pattern of occurrence of the phenomena |
| Relationship | Answers describe if and how two phenomena are related |
| Solution-focused | Describes better ways to solve some problem or situation. Examples are: <i>“What is an effective way to achieve X?”,</i> <i>“Which strategies help achieve X?”,</i> <i>“How can we refine S to achieve X in a better way?”</i> |

Sub-Types of Research Question

| Sub-Types of RQs | Examples |
|-------------------------|--|
| Exploratory/Existence | <i>“Does X exist?”, “Is Y something that software engineers really do?”</i> |
| Exploratory/Descriptive | <i>“What is X like?”, “What are its properties/attributes?”, “How can we categorize/measure X?”, “What are the components of X?”</i> |
| Exploratory/Comparative | <i>“How does X differ from Y?”</i> |
| Base-rate/Frequency | <i>“How often does X occur?”, “What is an average amount of X?”</i> |
| Base-rate/Process | <i>“How does X normally work?”, “What is the process by which X happens?”, “In what sequence does the events of X occur?”</i> |

Sub-Types of Research Question

| Sub-Types of RQs | Examples |
|------------------------|--|
| Relationship/Existence | <i>“Are X and Y related?”, “Do occurrences of X correlate with Y?” “What correlates with X?”</i> |
| Relationship/Causality | <i>“What causes X?”, “Does X cause Y?”, “Does X prevent Y?”,</i> |
| Causality/Comparative | <i>“Does X cause more Y than Z does?”, “Is X better at preventing Y than Z is?”</i> |
| Causality/Context | <i>“Does X cause more Y under one condition than others?”</i> |

Sources for understanding research background

- Library catalogues
- Newspapers
- Journals
- Electronic databases
- Google Scholar
- ...

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Google Scholar

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VEE
Research Skills Development -
Six sessions and Assessment

Lecture Sessions and Material

1. Introduction to research (2)
2. Research ethics (1)
3. Literature review (1)
4. Research design and methods (2)

Google Classroom (Web and Mobile app)

Assessment

- Short research paper prepared by teams of size three (20 marks)
 - Draft paper (10 marks) by Sunday midnight after the 6th session
 - Final paper (10 marks) one week after the submission of reviews
- Anonymous individual review of a paper written by your classmates (5 marks)
 - Reviews four days after the draft paper submission

Class Participation

- Work done during the class is assessed towards class participation
- Each session the work of four groups are randomly selected for this purpose
- Based on the work completed the group members will get a mark between -1 (very poor) and +1 (excellent)
- Additional bonus marks may be awarded in some classes

Research Paper

- Topic or a research question addressing some research problem or question related to Smart cities, campuses, nations, or buildings.
- The paper may focus on an important and relevant topic with a specific research question
- Five to six page paper using prescribed Word templates (draft version and final version)

Research Smart Cities

A smart city uses digital technologies or information and communication technologies (ICT) to enhance quality and performance of urban services, to reduce costs and resource consumption, and to engage more effectively and actively with its citizens.



Suggested Topic Groups

- **Mobility:** transportation (public/private), traffic/ congestion management, multi-modal transport, ...
- **Environment:** hygiene, pollution control, green and clean city, waste management, ...
- **Living:** housing, social activities, recreation, ...
- **Services:** public/private, licensing, postal, bill payments, healthcare, ...