

# **WOX7001 – RESEARCH METHODOLOGY**

**Topic 2 – Research Problem, Research Questions, Research Objective, Scope**

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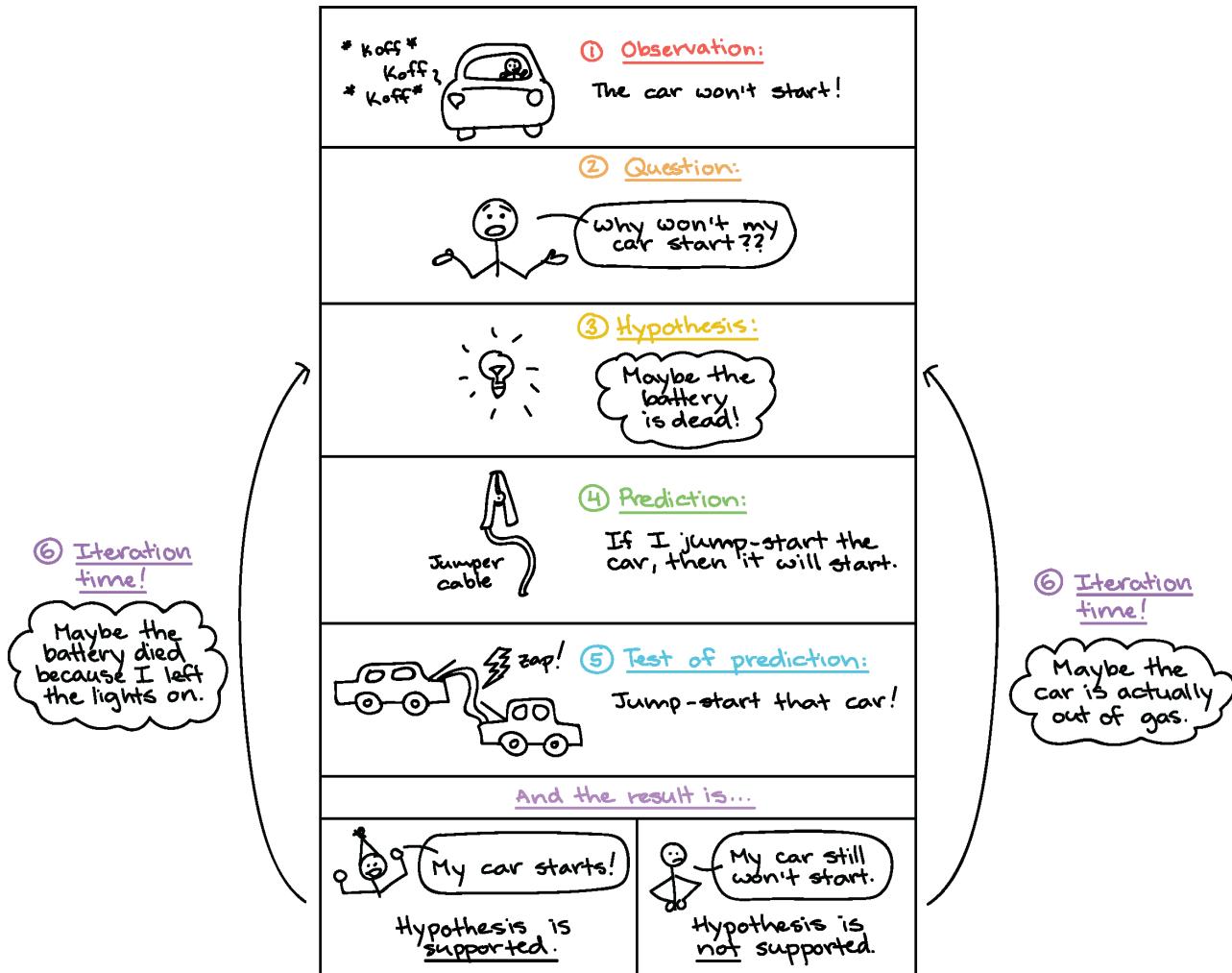


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# Research Problem

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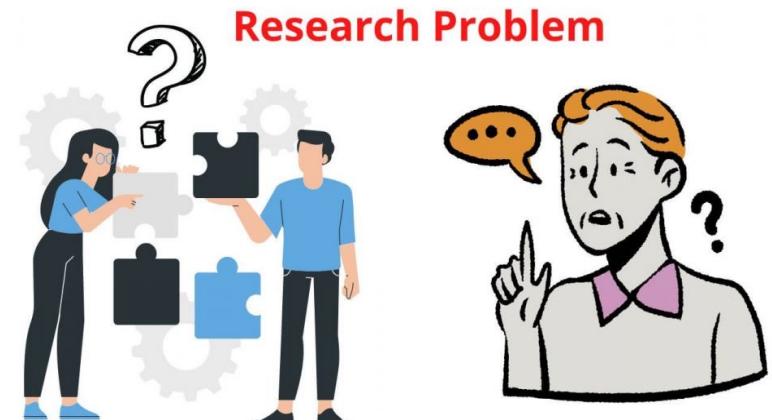
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# What is Research Problem?

- A research problem is a question that researcher wants to answer or a problem that a researcher wants to solve.
- Identification & formulation of a research problem is the first step of the research process.
- Selection of research problem depends on several factors such as researcher's knowledge, skills, interest, expertise, motivation & creativity with respect to the subject of inquiry.
- It is like the identification of a destination before under taking a journey.
- Without a problem, research cannot proceed because there is nothing to proceed to ward.



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# Research Problem Concepts

<b>Problem situation</b>	The context that has called a researcher's attention within the topic
<b>Research problem</b>	What a researcher thinks needs to be studied within the problem situation
<b>Problem statement</b>	Specific description of what intrigues a researcher. Generally speaking, it includes briefly what it is already known about the problem situation and that establishes the context from which the research problem emerges, what is unknown and deserves to be studied – the research problem- and why it is important to know about that problem
<b>Purpose statement</b>	What a researcher intends to find out or do in a study
<b>Research question</b>	What a researcher specifically wants to answer – or test- conducting a study



# **Research Problem is NOT....**

- A solution (how to do something)
- A question
- A title
- An opinion or speculation

# **Instead, Research Problem IS....**

- A situation that is broken
- Shows cause and effect relationship(s)
- A short and precise sentence
- Based on initial observations and evidence

# **Not all problem is a Research Problem**

- While problem to you might bother you; it might not qualify as research problem.
- If my company goes bankrupt, then this is my problem, but it is not a problem as such.
- So the situation is a problem to me, but it is not a research problem as nothing is broken in that situation

# Example of Research Problem

The organization **is showing a high fluctuation rate** as the **leadership team**  
***is lacking people management skills.***

The above example of research problem:

- **is broken**
- a **cause** and **effect** relationship is in place, and they are short and precise; and
- **initial observations and evidences** are mentioned.

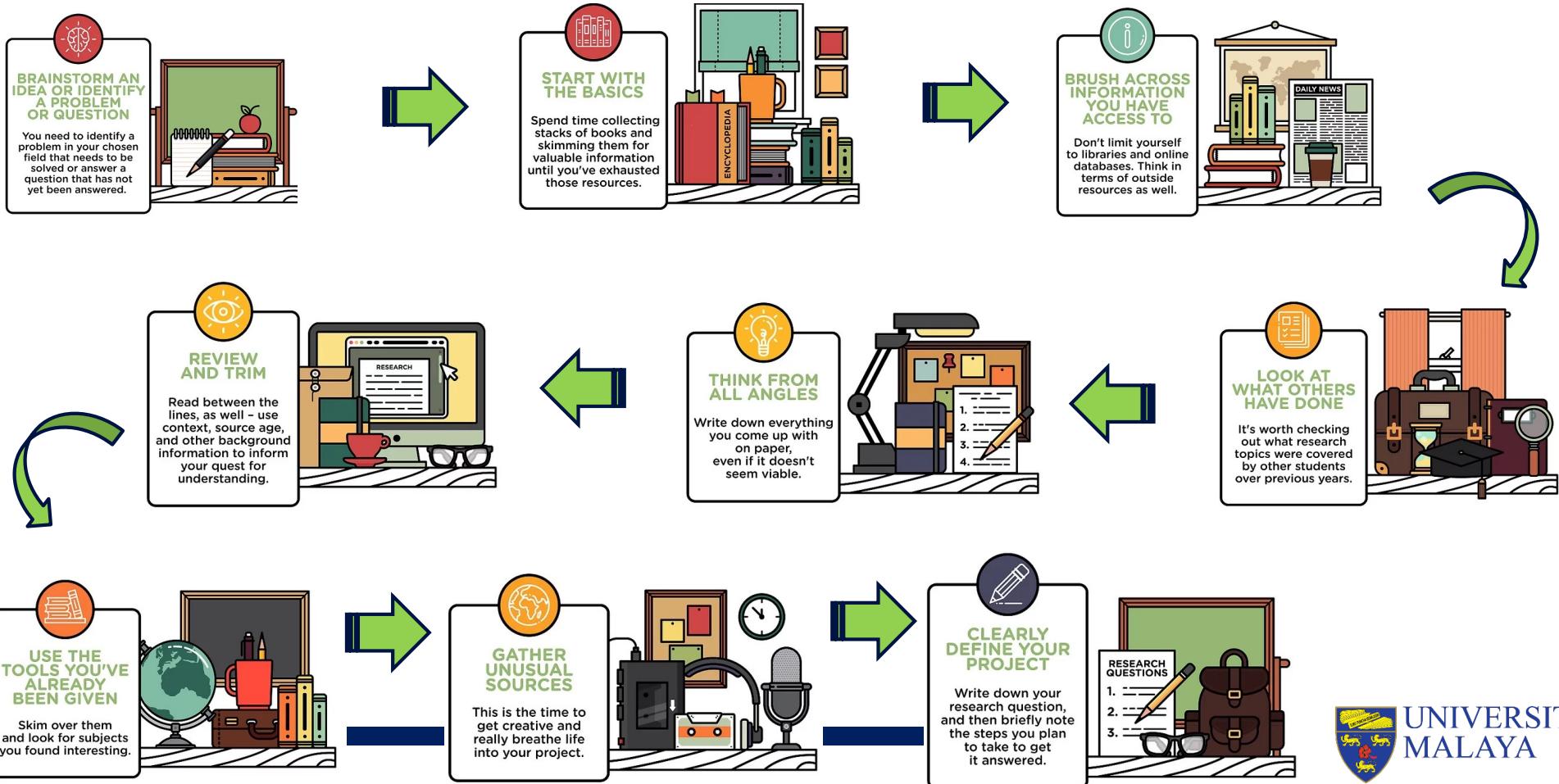
# **Points to Consider while choosing the Research Problem**

- The subject on which research work has been overdue should not be chosen, because it will be a difficult task to throw any new light.
- The problem should neither be too narrow nor too vague.
- The topic of the research should be familiar and feasible so that the researcher can easily have an access to related research materials or source of research.
- Controversial subject should be avoided
- importance of subject, the qualifications , the training of researcher , the investment elements in the research in terms of time, money and energy.

# You and Your Research Problem ...

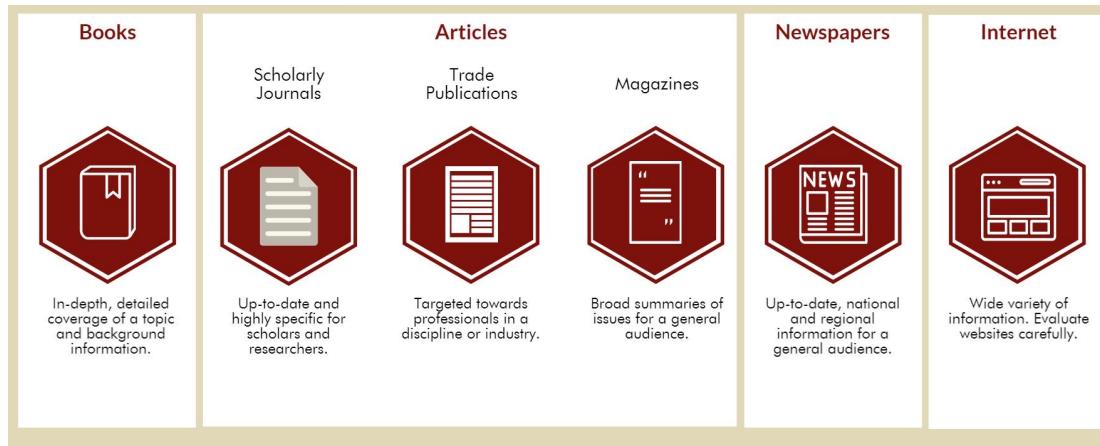
- At the start you will likely not know what the research problem is exactly.
- As you focus on it and consult the literature, the research problem will become clearer.
- It becomes clearer as you find more literature that looked at exactly the same situation from numerous angles.

# How to get the Research Problem



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# Source of Research Problem



# **Research Problem Format**

## **Declarative Format**

- a research problem is stated in declarative statement.
- Factors of Covid-19 infection

## **Interrogative Format**

- In interrogative format, a research problem is stated in question form.
- e.g- “What is the Factors of covid-19 infection among childrens?”



# How to write Problem Statement

- “The problem P . . .”: Here insert the problem as defined by the company.
- “. . . has the impact I .” Insert the negative impacts/pain points of the problem.
- “. . . which affects B . . .” Insert the parties that are affected. It could be the business, the customers or a third party.

# Sample

## 1.3 Problem statement

The Internet of Things (IoT) generates a massive volume of traffic from heterogeneous networks such as smart healthcare, smart grid, etc. One of the issues in existing routing schemes based on shortest paths and techniques like MPLS cannot manage the real-time data generated from devices especially for satisfying the multi-constrained Quality of Service (QoS) such as delay, packet loss, and jitter (Han et al., 2018). The literature has focused on utilizing a single QoS metric individually and there can be applications that need to satisfy multiple QoS metrics. Thus, there still exists a research gap on satisfying multi-constrained QoS metrics in the smart healthcare systems using the SDN approach.

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# Another Sample

## 1.3 Problem Statement

Laboratory experimental practice is an important teaching concern nowadays. Ironically, a class full of students do not allow to conduct laboratory exercises individually by each student, due to the minimal resources and time according to the traditional procedure. Not only in such situation but also, the pandemic like covid-19 has enforced and proven that doing lab work under a remote robotic laboratory platform can be an effective solution and can further bring massive evolution to the education system. In this research, to overcome the considered situations, an online framework for real-time lab exercise remotely has been developed. To evaluate the developed system a survey was conducted on students of mechanical engineering who have used the remote robotic laboratory facility.



# One more sample

## 4 PROBLEM STATEMENT

Even though many of the researches come-up with many approaches to minimize the DoS attack on the SIP-VoIP architecture. But still there is lot of DoS attack being conducted against architecture every day. This is because basically SIP protocol is a test base and involves a simple connection process and easy to implement. In that case it is difficult to find false signal performing in running services.

DoS attacks used against the target to make the SIP-VOIP network unavailable so that legal user should not have access to the services. This way attacker can gain many of the advantages including monetary value.



# How To Research Effectively?



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# Research Question

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# **Research answers questions - but what kinds of questions - and where do the questions come from?**

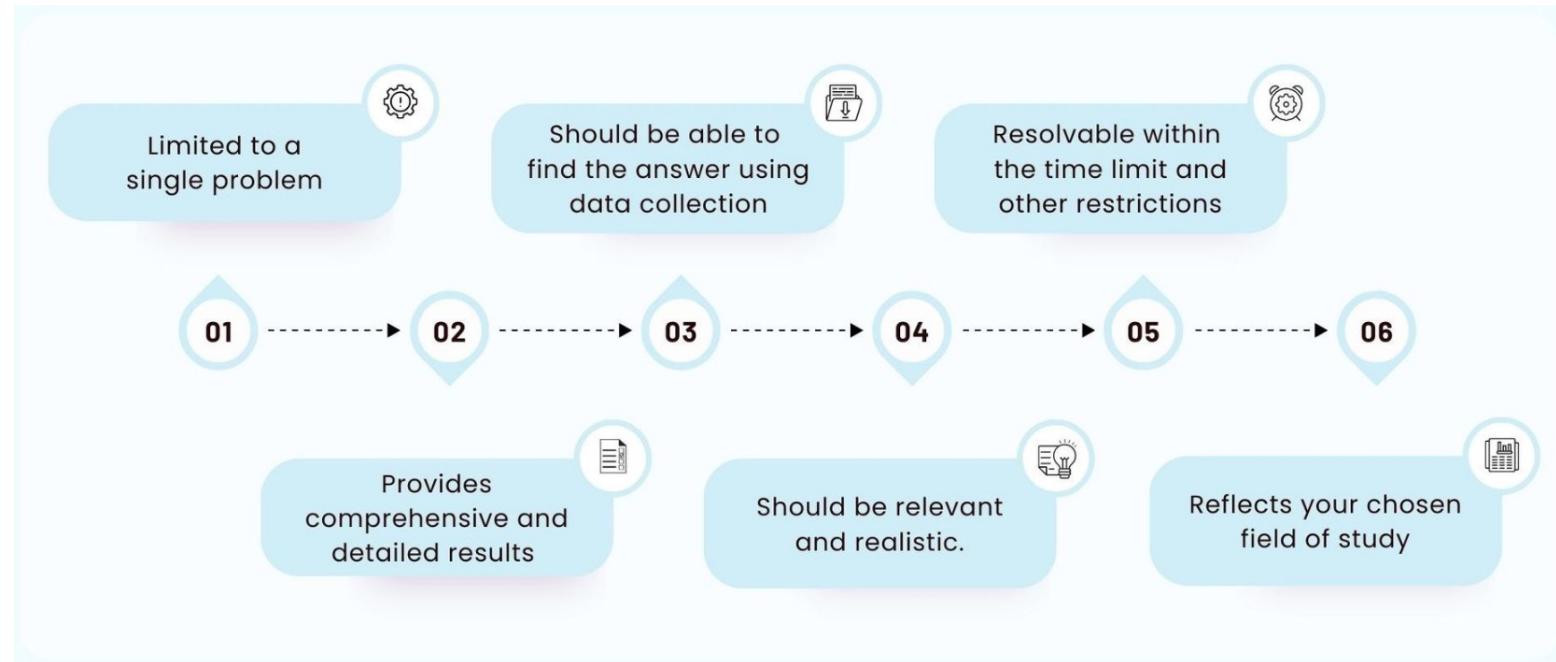
- Understanding the reality – How is world is - what is happening – positive questions?
- Understanding how you want world to look like – Normative questions?
- Research is well suited for answering positive questions.
- Research does not help much in answering normative questions.



# Research Question

- The research question defines the “area of interest” but it is not a declarative statement like a hypothesis
- Research question : main broad questions - general focus
- Research question may be complemented by a few investigative questions : secondary/sub questions-specific : to narrow the focus-important for data measurement.
- A clear research statement or problem must translate into a research question.
- Research question to be fact-oriented, information–gathering question.
- Research question must be capable of being confirmed or refuted.

# Characteristics of Research Question



# **Research Question (RQ) - Example**

- Research Topic : An International comparison of Technology Adoption Testing the UTAUT Model
  - » RQ1 How does acceptance of a technology vary across cultures?
  - » RQ2 What factors in the UTAUT model most significantly differ across cultures and what are the implications of these differences?

# **Research Question (RQ) - Example**

- Unclear: How should social networking sites address the harm they cause?
- Clear: What action should social networking sites like MySpace and Facebook take to protect users' personal information and privacy?

# Problem Statement vs Research Questions

Problem	Question
Due to poor revenue collection, a small-sized company ('A') in the UK cannot allocate a marketing budget next year.	What practical steps can the company take to increase its revenue?
Many graduates are now working as freelancers even though they have degrees from well-respected academic institutions. But what's the reason these young people choose to work in this field?	Why do fresh graduates choose to work for themselves rather than full-time? What are the benefits and drawbacks of the gig economy? What do age, gender, and academic qualifications do with people's perceptions of freelancing?

# Research Objective

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# We have asked the question, how to answer it???

- ‘A research objective is a clear, concise, declarative statement, which provides direction to investigate the variables.’
- Generally research objective focuses on the ways to measure the variables, such as to identify or describe them.
- Sometime objectives are directed towards identifying the relationship or difference between two variables.

# Research Objective

- Having decided what to study (Research Topic), and knowing why you want to study it (Problem Statement), you can now formulate the study objectives.
- Objectives should be closely related to the statement of the problem. For example, if the problem identified is low utilization of health stations in a rural district, the general objective of the study could be to assess the reasons for this low utilization.
- If we break down this general objective into smaller and logically connected parts, then we get specific objectives.

# **Research Objective**

- Research objectives are the specific actions/ activities to answer the research questions.
- Objectives indicate what we are trying to get from the study or the expected results / outcome of the study.

# How to Make RO look SMART...



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# Examples of SMART research objectives

Ineffective (incomplete) research objectives	SMART research objectives
Study employee motivation of Coca-Cola	To study the impacts of management practices on the levels of employee motivation at Coca-Cola US by December 5, 2022
Analyze consumer behaviour in catering industry	Analyzing changes in consumer behaviour in catering industry in the 21 <sup>st</sup> century in the UK by March 1, 2022
Recommend Toyota Motor Corporation management on new market entry strategy	Formulating recommendations to Toyota Motor Corporation management on the choice of appropriate strategy to enter Vietnam market by June 9, 2022
Analyze the impact of social media marketing on business	Assessing impacts of integration of social media into marketing strategy on the level of brand awareness by March 30, 2022

# Type of RO (General vs Specific)

• General	• Specific
<ul style="list-style-type: none"><li>General objectives can be broken into small logically connected parts to form specific objectives.</li></ul>	<ul style="list-style-type: none"><li>Specific objectives are short term &amp; narrow in focus.</li></ul>
<ul style="list-style-type: none"><li>General objective is met through accomplishing all the specific objectives.</li></ul>	<ul style="list-style-type: none"><li>The specific objectives are more in number &amp; they systematically address various aspects of problem as defined under 'the statement of problem' &amp; key factor that is assumed to influence or cause the problem.</li><li>They should specify what the researcher will do in the study, where, &amp; for what purpose.</li></ul>

# Things needed to write RO

- Use action verbs that are specific enough to be measured (to determine, to compare, to verify, to calculate, to describe, to find out, to establish etc.)
- Avoid the use of vague non-action verbs such as to appreciate, to understand, to study, to believe
- Objectives may be specified in the form of actions (verbs) to answer the posed questions- generally objectives begin with to : discover ...., determine ...., establish ...access....., identify....., compare ...., analyze, evaluate....., ...etc.

# Bad Research Objectives

- Objective 1: To examine whether alcohol consumption is associated with increased partner violence.
- Objective 2: To complete face-to-face interviews with a purposive sample of 10 couples with a history of partner violence by 20 September 2010.

# Example RQ vs RO

RQ	RO
<ol style="list-style-type: none"><li>1. What are the factors that the most lead to the teacher stress?</li><li>2. What is the relationship between level of stress and categories of health problem?</li><li>3. How does stress affect the job performance among teachers?</li></ol>	<ol style="list-style-type: none"><li>1. To identify the factor that lead to the stress among teachers.</li><li>2. To determine the relationship between stress and health problem</li><li>3. To explore the effect of stress in job performance among teachers.</li></ol>

# **Example RQ vs RO**

## **1.4 Research Questions**

1. Is it feasible to implement AR in public service advertisements?
2. Which AR SDK can provide the best performance of marker identification and tracking in designing public service advertisements?

## **1.5 Research Objectives**

Following research objectives would facilitate the achievement of this aim:

1. To conduct a feasibility analysis for AR-based public service advertisements.
2. To compare/investigate the marker identification and tracking performance of AR SDKs in designing public service advertisements.
3. Evaluate the result of the investigation of the resulting SDK.

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# Example RQ vs RO

## 3. RESEARCH QUESTIONS

1. What are the security and privacy issues affecting the IoT-based networks?
2. What are the security and privacy issues affecting the Edge computing paradigm?
3. What are the limitations of the existing authentication and key agreement (AKA) techniques deployed to IoT-based networks?
4. How can we solve the identified issues using a proposed lightweight authentication and key agreement technique to provide secure communication in the IoT-based networks?
5. How can we incorporate a mechanism for dynamic addition of network entities after the initial deployment for ensuring scalability?
6. How can we analyze and test the security and lightweight features of the proposed technique using the available parameter metric functions?
7. How can we compare and evaluate the performance of the proposed technique against the existing benchmarking schemes?

2. To study and perform critical analysis of the state-of-the-art authentication techniques for securing the IoT-based networks.
3. To design and implement a lightweight authentication key agreement technique for secure communication in the IoT-based networks.
4. To incorporate a mechanism for dynamic addition of network entities after the initial deployment for ensuring scalability.
5. To analyze and evaluate the performance of the proposed technique in terms of lightweight and security features using the benchmark evaluation metrics, and compare with the existing techniques

# **Example: Research objectives and data collection methods for a study of walkability in urban environments**

<b>Research objectives</b>	<b>Data sources (samples)</b>	<b>Methods</b>	<b>Examples of questions</b>
1. To examine the specific factors that influence people to walk in urban environments	Pedestrians and drivers of motor vehicles	Interviews	What makes it more likely for you to walk? What places or routes are you most likely to walk? Why do you walk in these places? What places would you not walk? Why?
2. To identify what physical features contribute to the walkability of urban environments	Pedestrians Urban planners	Interviews Key informant interviews	What aspects of the physical environment make it easier for you to walk? what places do you most often see people walking?
3. To identify what physical features relating to walkability can be enhanced by urban planners	Urban planners	Key informant interviews	What are some examples of physical changes which have increased the number of people walking?

## Research Question

How viral marketing affects consumer behaviour among university students in Malaysia?



## Research Aim

Analysing the effects of social media on consumer behaviour among university students in Malaysia.



## Research Objective 1

To assess the current level of popularity of social media among university students in Malaysia.

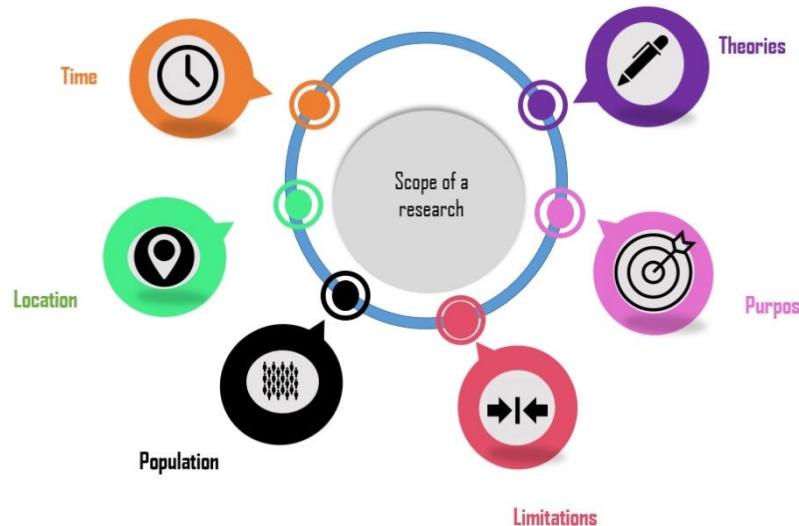


## Research Objective 2

To forecast the implications of social media on consumer behaviour among university students in Malaysia.

# Research Scope

- The scope of a study explains the extent to which the research area will be explored in the work and specifies the parameters within the



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## **Class Activity**

### **Estimated time – 1 hour**

- Find 1 article related to your research interest and complete the table below by identifying the PS, RO. Justify is the outcome/contribution was related to the objective set in the research.

PS	RO	Justification of the Outcome

# Thank You!

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