The Research Process

Identify research problem – Aim/Research question  
  
Identify how to achieve the aim – Objectives  
  
Determine how to approach the research Methodology  
  
Specify information required – Data requirements  
  
Decide how to get that information – Method/Research tools  
  
How to use this information – Data analysis  
  
Interpret the information with respect to the aim – Discussion/Conclusion  
  
  
  
The importance of DATA  
  
You cannot undertake research without some form of data  
  
You must be generating your OWN results, not just talking about someone else’s  
  
This means collecting and analysing data, and then drawing conclusions based on your understanding of theory  
  
For your research project it is not sufficient to just develop technology (software or hardware).  
  
You can do this as part of the project – but you must still gather and analyse data relating to the solution of a problem

**Starting out**  
  
This first part of the research process is determining a topic:   
  
For students – what is the core area of your degree?  
  
What specific topics are you interested in?  
  
It is much easier to do research if you are genuinely interested in the answer!  
  
Is there some kind of problem that needs solving?  
  
A question which is unanswered?  
This then leads to your research question  
Discussion – Topics of interest What makes a ‘topic’. What topics can you think of that relate the area of study of your degree

The Research Question  
  
Once you have a topic, all projects start with a research question  
  
The research question serves two purposes:   
• it determines where and what kind of research is needed   
• it identifies the specific objectives the study will address  
  
  
Relevant  
  
Manageable  
 • in terms of research and in terms of your own academic abilities.  
  
Substantial and with original dimensions.  
  
Consistent with the requirements of the assessment.  
  
Clear and simple.

Interesting.  
  
E.g. ‘Are young people losing interpersonal communication skills due to usage of social media?’  
  
Discussion   
• Evaluate the question.   
• Use the chat function or raise your hand to discuss.  
  
  
  
A CORE STARTING POINT FOR YOUR RESEARCH IS TO DO DEVELOP YOUR BACKGROUND  
  
WHAT THEORY AND PRACTICE UNDERPINS YOUR PROJECT?  
  
YOU WILL WRITE A BACKGROUND SECTION IN ALL RESEARCH ARTICLES (THIS IS OFTEN PART OF THE INTRODUCTION, OR COMES UNDER A SUBHEADING)  
  
Background   
• Sets the general context for the study   
  
• Helps to:   
• Explain the core concepts to a reader who may be unfamiliar with them   
• Justify the need for this research • Show that you have fully investigated the methods which you could use.   
• Show that you have understood underlying theory for your project.   
• Show awareness of similar studies  
  
Background vs Literature Review  
  
This is something that confuses people every year  
  
It is not very well standardized across different publications  
  
A ‘background’ is a general introduction to a topic, to allow the reader to understand the research context.  
  
There are many kinds of ‘literature review’.

• A ‘narrative’ review is basically a background

•Other forms of review are research studies in their own right.  
  
Narrative reviews tell a story – i.e. set the context for the study. This is the same as a background, so it is better practice to call it a ‘Background’ section. Other forms of literature review exist to examine the existing literature for gaps, to determine the approach for a study, or to assess the whole body of literature for an answer to a research question. We will discuss these further in later weeks.  
  
Assume that your reader is technically literate, but not knowledgeable about your field.  
  
Enough technical detail for reader to understand core details of your report.  
  
You are trying to pass on information to the reader:  
Not which books you have read, but HOW the technology or technique etc. works…  
  
The term ‘use of literature’ in the assessment criteria means citing your sources.~  
  
The background serves a number of purposes for both the author and the reader: Demonstrates Understanding of the topic Communication of key information and setting context to the reader Writing for the audience – multidisciplinary research. A lot of research crosses disciplines. You need to explain core information to the reader, which you might think is evident, but they don’t understand. Citing your sources – you have to show that your research is up-to-date, and has investigated all the current studies on the topic. You are also providing an audit trail for a reader who wants to read up more thoroughly on the project. Understanding the application of standards (ISO, IEC etc)  
  
Example – research paper

??????  
  
  
  
Citation or referencing  
‘Citation’ is giving the source for your information  
Technically the ‘reference’ is the source you referred to.  
Citing your references provides an audit trail of where you got your information from.  
  
(also that you have done your research)

Plagiarism is when a student incorporates someone else’s work in a way which suggests that it is the student's own work. E.g. unacknowledged quotation, paraphrase, Serious Academic misconduct penalties apply

**Empiricism**

The Western empirical tradition can be seen as an attempt to avoid the undirected interpretation of artefacts. It has produced the most dominant research model since the seventeenth century. It can be summarised by the following stages:

* **Hypothesis generation**  
  This explicitly identifies the ideas that are to be tested by the research.
* **Method identification**  
  This explicitly identifies the techniques that will be used in order to establish the hypothesis. This is critical because it must be possible for one's peers to review and criticise the appropriateness of the methods that you have chosen. The ability to *repeat* an experiment is a key feature of strong empirical research.
* **Result compilation**  
  This presents and compiles the results that have been gathered from following the method. An important concept here is that of statistical significance; whether the observed results could be due to chance rather than an observable effect.
* **Conclusion**  
  Finally, the conclusions are stated either as supporting the hypothesis or rejecting it. In the case that results do not support a hypothesis, it is important always to remember that this may be due to a weakness in the method. Conversely, successful results might be based upon incorrect assumptions. Hence, it is vital that all details of a method are made available to peer review.

**JOHNSON, C.,** n.d. *What is Research in Computing Science?* [viewed 3 July 2023]. Available from: https://www.dcs.gla.ac.uk/~johnson/teaching/research\_skills/research.html

Rationalism and empiricism are two contrasting philosophical approaches that focus on different sources of knowledge and the methods by which knowledge is acquired.

Rationalism posits that reason and innate ideas are the primary sources of knowledge. Rationalists argue that certain truths and principles can be known using logical reasoning alone, independent of sensory experience. According to this perspective, knowledge is derived from a priori reasoning, meaning it is based on principles that are self-evident or derived from basic truths. Rationalists believe that the mind possesses innate knowledge or concepts that are present from birth, which then serve as the foundation for understanding the world.

On the other hand, empiricism asserts that knowledge is primarily obtained through sensory experience and observation. Empiricists argue that all knowledge comes from the information provided by our senses, and that our understanding of the world is built upon these empirical observations. Unlike rationalists, empiricists claim that the mind at birth is essentially a "blank slate" or tabula rasa, and that all knowledge is acquired through experience and perception.

The differences between rationalism and empiricism can be illustrated by their contrasting views on topics such as the nature of knowledge, the existence of innate ideas, and the limits of human understanding. Rationalism places a greater emphasis on reason and deduction, while empiricism emphasizes the role of sensory perception and empirical evidence.

It's worth noting that these two approaches are not mutually exclusive, and many philosophers recognize the value of both reason and experience in acquiring knowledge. Contemporary philosophical thought often incorporates elements of both rationalism and empiricism, seeking a more comprehensive understanding of the nature of knowledge and the processes of acquiring it.

**MARKIE, P., 2004**. *Rationalism vs. Empiricism (Stanford Encyclopedia of Philosophy)* [viewed 3 July 2023]. Available from: https://plato.stanford.edu/entries/rationalism-empiricism/

A research question is a clear, focused, and specific inquiry that guides a research study. It is a crucial component of the research process as it helps define the scope and purpose of the study. A well-formulated research question helps researchers identify what information they need to gather, analyse, and interpret in order to address their research objectives.

A research question should be:

1. Clear: It should be easily understandable and free from ambiguity.
2. Focused: It should have a specific scope, avoiding overly broad or vague inquiries.
3. Relevant: It should align with the topic of investigation and contribute to existing knowledge or address a gap in understanding.
4. Feasible: It should be realistically answerable within the constraints of the available resources, time, and methodology.
5. Interesting: It should be intellectually stimulating and hold significance for the field of study.

A well-crafted research question guides the entire research process, including the selection of research methods, data collection, analysis, and interpretation of results. It helps researchers stay focused and ensures that their study generates meaningful and valuable insights.

For example, a research question in the field of psychology could be: "What is the relationship between sleep deprivation and cognitive performance in university students?" This question specifies the variables of interest (sleep deprivation and cognitive performance) and the population under investigation (university students), providing a clear direction for the study.  
  
  
  
"What is the relationship between customer satisfaction and online reviews for a specific e-commerce platform, and can sentiment analysis of these reviews be used to predict customer satisfaction levels?"

This research question focuses on exploring the connection between customer satisfaction and online reviews in the context of an e-commerce platform. The goal is to investigate whether sentiment analysis, a natural language processing technique, can be applied to predict customer satisfaction levels based on the content of the reviews.

This question could guide the data science project, which would involve collecting and analysing a dataset of customer reviews and associated satisfaction ratings. The project may include tasks such as sentiment analysis, feature extraction, model training, and evaluation to determine the predictive power of online reviews in estimating customer satisfaction.