What is a Research Project?

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Hello

Research Projects

Research Projects (1)

What is research?

- Process of adding something new to a body of knowledge for a particular topic/field of study
- Collecting and analysing information to improve our understanding
- An iterative process to explain or solve an identified problem
- Research is carried out to:
  - get results using scientific methods
  - solve problems and lead to new insights
  - prove or disprove new or existing ideas

Research Projects (2)

What is the purpose of research?

- Develops and evaluates concepts, practices and theories
- Gathers information on a particular topic that is lacking in knowledge
  - knowledge obtained is for practical purposes
- Providing facts that serve as a basis for:
  - planning
  - decision-making
  - project implementation
  - testing and evaluating
- Improve upon existing techniques to develop new artefacts
  - i.e. Three-Step Authentication for ATMs

Research Projects (3)

Good and Bad Practices of Research

Bad Practices

- There is already an answer to the proposed hypothesis
- No question to test
  - i.e. using endpoint management to defend networks
- Topics for the research have no resemblance to one another
  - i.e. networks and kittens — how do they correlate? **Cat**6 cables?
- Using too many buzzwords
  - i.e. investigating the use of blockchain to drive web 4.0 cloud technologies with 5g

Good Practices

- Originates with a question or a problem
- Follow a specific plan or procedure
- Divides a main problem into smaller sub-problems
- Requires a collection and interpretation of data
- Object and free from personal bias
- Includes all necessary content and enough details to convey meaning
- Excludes information that is already known

Characteristics of Research

Characteristics of Research (1)

What are the characteristics of research?

- There are eight typical characteristics to research
  1. Empirical
  2. Logical
  3. Cyclic
  4. Controlled
  5. Hypothesis-based
  6. Analytical
  7. Objective
  8. Statistical Treatment

Characteristics of Research (2)

Empirical and Logical Research

Empirical

- Conclusions and decisions are based on valid data or evidence collected
- Analysed quantitatively or qualitatively
- Instead of using just logic, focuses on direct observations and assessment
- Useful for research in topic areas such as law and medical

Logical

- Follow sequential procedures that are based on valid principals
- Research is implied by logical reasoning rules
- Also follows the logical process of induction and deduction
  - *induction*: the reasoning process from a part to the whole
  - *deduction*: reasoning from the premise

Characteristics of Research (3)

Cyclic and Controller Research

Cyclic

- Starts and *ends* with a question
- A cyclic process of steps that identifies problems
- Involves the following:
  - reviewing literature
  - specifying a purpose for the project
  - collecting and analysing data
  - forming an interpretation of the information

Controlled

- Investigations are performed with rigorous measures
- Keeps all research variables constant
  - excluding those under investigation
  - i.e. compares results from a controlled group to a non-controlled group

Characteristics of Research (4)

Hypothesis-based and Analytical Research

Hypothesis-based

- **The research you will be undertaking**
- A statement about a scientific study's expected outcome
- Requires three attributes to form a genuine hypothesis:
  1. specificity
  2. testability
  3. falsifiability
- Produces evidence to satisfy the research objectives
  - will prove or refute the hypothesis

Analytical

- Data is generated and analysed using proven techniques
  - ensures a high accuracy and repeatability whilst minimising any potential errors
- Often used during studies to find the most relevant information
- Use of these necessary details will inform new ideas for artefacts being produced

Characteristics of Research (5)

Objective and Statistical Treatment Research

Objective

- Sound judgement is used to ensure that the findings are valid
- Often classified as:
  - descriptive
  - correlational
  - exploratory
  - explanatory

Statistical Treatment

- Statistical methods are applied to a data set to transform it
  - goes from something meaningless to meaningful
- Converts available data into something in which information can be derived from

Types of Research

Types of Research (1)

What are the different types of research?

- Research can be split according to their purpose:
  1. Fundamental
  2. Applied

Fundamental Research

- The beginning of searching new knowledge
- Provides a foundation for knowledge
  - often generalisable to many areas of study
- Considered with the methods, theories and ideas
- Driven by the curiosity of the researcher
  - or a particular interest in the scientific question
- The main motivation is to expand a person's knowledge
  - does **not** involve implementing an artefact

Examples: Fundamental Research

- How to prevent phishing attacks.
- How to prevent social engineering attacks
- Can Cyber Warfare Become a New Arena of Conflict?
- Is Cyber Warfare the Future of War?

Applied Research

- A scientific study to solve a practical problem
- Find a solution to an everyday problem
  - does not acquire knowledge for the sake of it
- Applies and tailors knowledge to address a practical issue
  - towards the development of more efficient technologies

Examples: Applied Research

- Three-Step Authentication for ATMs
- Cryptography Process for Secure Storage System

Goodbye

Goodbye (1)

Questions and Support

- Questions? Post them in the **Community Page** on Aula
- Additional Support? Visit the Module Support Page
- Contact Details:
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