Introduction to Research Methods

CPS7007
Dissertation
Dr Elisabetta Canetta

Today's Plan

- To fully understand what is expected in the dissertation module:
  - Module organisation
  - Module assessment
  - Role of supervisors
- Managing your research project (and other commitments!)
- Formulating clear research questions

CPS7007: Aims

This module is designed to prepare you to formulate research questions, conduct research that uses quantitative and qualitative methods, evaluate findings, and consider ethical issues. You will

- Develop a research proposal that demonstrates the ability to identify research gaps, formulate research questions, and select appropriate research methods

- Gain the necessary skills to critically evaluate the strengths and limitations of different research methodologies and make informed decisions in selecting methods for your own research

- Acquire knowledge needed to conduct independent research, including data collection, analysis, and interpretation

Module Structure

When: 20th June, 27th June, 04th July, 11th July

- Introduction to Research Methods
- Research ethics and integrity/avoiding plagiarism
- Research design, data collection and analysis
- Data interpretation and reporting

What: Expectations?

- To undertake an in-depth independent study of a specific area within Computer Science
- Develop your knowledge and critical understanding of your selected topic

Module Assessment

10,000 word dissertation (60%)

AND

Viva (Oral Presentation) in a format suitable for presenting at an international conference (12 minutes presentation & 8 minutes defence/questions) (40%)

Electronic Submission only for both dissertation and presentation

Supervisory Meetings

Meeting your supervisor

- Recommended to meet approx. every two to three weeks at a mutually convenient time
- It is your responsibility to make and keep the appointment with your supervisor

The meetings are designed to

- Discuss the format of your project work
- Set up short and long term objectives within the time frame
- Review progress to date
- Resolve problems encountered in project work
- Encourage you to develop ideas and approaches to analysis.
- Allow your supervisor to give feedback on performance, to date

Supervisory Meetings (2)

Purpose of logbook:

- You are required to maintain a logbook whilst undertaking your project
- The logbook is a record of every meeting with your supervisor and the points discussed and the agreed activities for each phase of the project

Format of the logbook (electronic form):

Time/date meeting	Summary of work done since last meeting	Agreed points of action for student to undertake in agreed timeframe	Agreed time & date for next meeting

Barriers to success on this module

Poor engagement

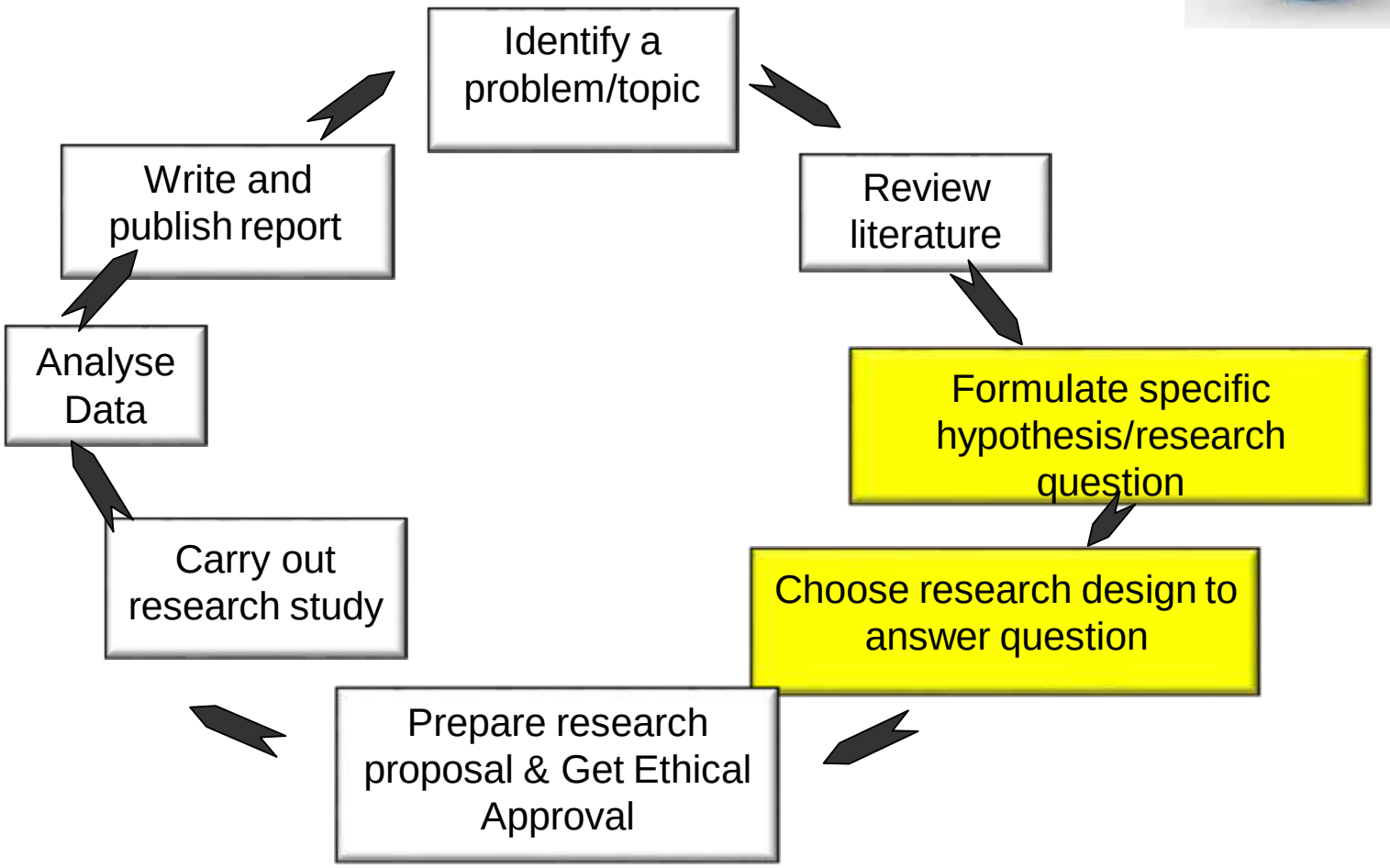
Lack of personal responsibility

Poor time management

Lack of independent learning

Pro active independent learning is key to success

Research process



What next?

- Arrange a meeting with your supervisor to discuss your research ideas
- Prepare a research proposal
- Discuss your proposal with your supervisor
- Prepare ethics application (if applicable)

Ethics application

- General ethical principles
- Preparing background information and method detail for your ethics application
- Key sections of ethics application form
- Additional forms required for ethics application
- Submitting your application
- Common errors in application forms

University Guidelines

https://www.stmarys.ac.uk/research/staff-information/ethical-review-process.aspx

- Ensuring research integrity and quality
- **Respect the autonomy of all participants**
- **Avoid harm**
- Treat everyone fairly and with respect

Ethics – Autonomy of Participants

‘*It is the responsibility of researchers to respect the autonomy of everyone involved in the research: this includes fellow researchers, participants and those who may not be actively involved but about whom data is used*.’

‘***To respect autonomy, researchers should obtain informed consent and avoid practices and methodologies that involve deceit, coercion, dishonesty, invasion of privacy, breaking confidentiality and using data for purposes not clearly explained to participants***.’

Ethics – Avoid Harm

Harm includes:

Physical

Psychological damage

Stress (Individuals & Groups)

If this occurs = Project scrapped = No Dissertation!

Ethics – Avoid Harm (2)

Harm may also include damage to the reputation of the University, the research discipline & future research

This can be caused by a project that is ill-conceived, deceptive, carelessly executed or irresponsibly used

If this occurs = Project scrapped = No Dissertation!

Submitted for Level 1

Level 1 – Consideration

A low risk is defined as one where potential harm to participants is no greater than that encountered in everyday life. It also includes research where the researcher(s) are working with participants from vulnerable groups (in line with the Safeguarding Vulnerable Groups Act 2006) but will not be alone with them at any time i.e. they will be overseen at all times by an experienced individual who holds a DBS check undertaken within the last 3 years, and will not be storing images, videos or personal details of children under 18 years of age.

- Supervisor will sign off your application (if satisfactory)
- Ethics committee will be informed that you have been given level 1 approval
- You will receive confirmation that you have level 1ethical approval and may begin data collection

Submitted for Level 2

Level 2 – Consideration

A medium risk is defined as one where potential harm to participants is greater than that encountered in everyday life. It also includes research where the researcher(s) are working with participants from vulnerable groups and/or they will be storing images, videos or personal details of children under 18 years of age, but they have produced satisfactory DBS check(s) on themselves undertaken within the last 3 years.

- Your supervisor will submit your completed application to the Faculty ethics committee
- You will receive a response from the ethics committee informing you that
  - A) You have been granted level 2 ethical approval and can begin data collection
  - B) Amendments/more information are required – update and resubmit
  - C) Your application has been referred on to the University ethics committee

Submitted for Level 3

Level 3 –Detailed Consideration

This applies to activities that require careful scrutiny due to their potential for physical or psychological harm. A high risk is defined as one where there is a possibility that significant harm will be caused to participants (e.g. an adverse reaction to a drug or supplement, physical damage/injury, psychological or emotional harm). It also includes research where the researcher(s) will be alone with participants from vulnerable groups and/or will be storing images, videos or personal details of children under 18 years of age.

- Supervisor will forward your completed application to the University Ethics Committee
- You will likely be invited to attend an ethics meeting to discuss your application and answer any questions/concerns the committee have
- You may receive ethical approval, or may be asked to make some amendments

St Mary's University Twickenham London

Ethics Application Process

Student completes the application for ethics approval in consultation with the supervisor.

Supervisor checks the accompanying documents & signs the form

Level 1 Approval*
Minimal ethical risk. Form can be signed by supervisor . Student may proceed with research.

*Logged & Reported via the Ethics Rep to the Ethics Sub-Committee

Level 2 Approval*
Medium ethical risk. Form is signed by supervisor and referred to School Ethics Rep for review.

*This includes pre-approved protocols for a programme

Level 3 Approval
High ethical risk. Application and accompanying documents are forwarded to Secretary of the Ethics Sub-Committee, via the School Ethics Rep, and by the advertised deadline for consideration.

Level 2 Approval given and student may proceed with research.

The Ethics Sub-Committee reviews the application and the student & supervisor are invited to present.

The Ethics Sub-Committee approves the application and the student may proceed with their research.

Amendments are required to be made and either re-submitted for Chair's Action or re-submitted for consideration by the next meeting of the Ethics Sub-Committee.

The amended and re-submitted application is signed off by the Chair and the student is informed by letter that ethical approval has been given .

Ethics – Common Myths

1. Ethics Committee Boards are not there to ‘trip you up’

2. Ethics Committee Boards are ‘hard’ or ‘scary’
   (‘*so I can’t be bothered*’)

3. ‘*I’ll just do a questionnaire coz it’s easy and just needs a Level 1*’

If your ethics is thorough =

Sent back to you

Your supervisor may send you back your application because

- You haven’t filled in all the relevant sections to a satisfactory standard

- You haven’t included all the relevant forms required

- The form has not been signed

etc.

This will delay the start of your project!!

Other forms required for ethics application

- Participant Information Sheet
- Participant Consent Form
- Risk Assessment Form
- Letter from Host Organisation (if applicable)
- Participant Recruitment Material
- Copies of research instruments/questionnaires/PAR-Qs etc

Consent Form

- Template available on Student portal
  - Minimal changes required (title/contact details)
- Participants under age of 18 consent required from parents/ carers as well as participants
- Signed consent forms should be stored securely by the researcher
  - Handed in at end of project

Contact details are required
- St Mary's email address only
- Supervisors contact number

→ Or application will be rejected!

Participant Information Sheet

- Allows participants to make an informed decision about whether to take part in your research or not
- Template on Student portal (ethics forms) to ensure all information required is included
- Consider your audience re language, terminology used
- Ordinary member of the public should understand!
- Multiple information sheets
  - Communicating with different participant groups (e.g. children/parents)
- Each participant should be able to understand from an information sheet exactly what participation would involve for them

Risk Assessment

- Template online - read thoroughly and complete relevant sections
- If your activity is not outlined in section 2 (risk controls) attach a copy of your methodology with specific safety notes
- You can email the Technical Services team to arrange a meeting to discuss the completed risk assessment

Finalising your application

- Once all sections of the application form and additional forms are completed to a satisfactory level you should: Compile all your documents into one document named as follows:

- Full Name – Faculty – Supervisors Name
- E.g. Joe Bloggs – FSTHS – Elisabetta Canetta

- Send the signed application to your supervisor for them to sign

- Until you have received confirmation that you have ethical approval (at any level) you cannot begin data collection

Ethical approval is not all you need!

- You must complete a project approval form and have this signed off by your supervisor

- This documents that:

  a) You have obtained ethical approval
  b) Your project is financially viable
  c) You have completed a risk assessment
  d) You are competent to carry out any tests/data collection necessary for your project

Top Tips

- **Review your Project Proposal**
  - Have you changed your mind about the project?
  - What needs changing? (if anything)

- **Speak to your supervisor**

- **Make a start on your ethics application <u>ASAP</u>**
  - Look at Student Portal & Moodle Pages for guidance

- **Speak to the Technicians (if applicable)**

- **Once completed ethics application submit it to and discuss it with your supervisor**
  - Decision is made on whether a Level 1/2/3

Importance of planning

- Creates a proactive approach not a reactive approach
- Enables you to meet deadlines - lowers academic stress!
- Permits setting of milestones to assist in controlling the project
- Highlights areas where support will be needed

What is Research?

The systematic process of collecting and analysing information (data) in order to discover new knowledge or expand and verify the existing one

Until we have subjected our problem to *rigorous scientific scrutiny*, our *'knowledge'* remains little more than guesswork or at best, intuition

Why Do Research?

Satisfaction of answering important questions which will allow you to

- Extend knowledge
- Put light on hidden facts
- Verify and test the existing facts
- and theories
- Find solution to a problem
- Publish your findings
- Stimulate further research

A requirement of my MSc Computer Science…

Types of research

- Descriptive & Analytical Research
- **Descriptive Research** is a fact finding investigation which is aimed at describing the characteristics of individual, situation or a group (or) describing the state of affairs as it exists at present
- **Analytical Research** is concerned with testing hypothesis and specifying and interpreting relationships

Some other types of research…

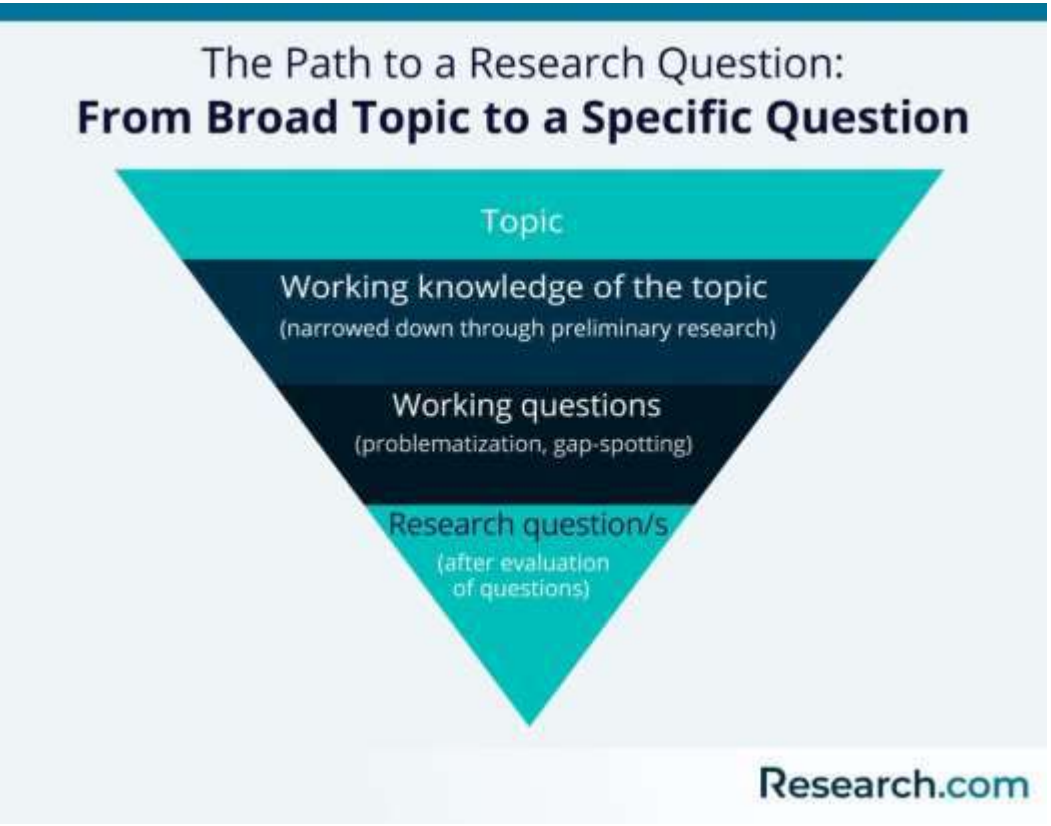
One-time Research – Research confined to a single time period

Longitudinal Research – Research carried on over several time periods

It's a correlation research study that involves repeated observations of the same item over long period of time – often many decades

Longitudinal research studies are often used in psychology to study developmental trends across the life span

Research question



Research question (2)

Research objectives	Research question formulations
Describing and exploring	• What are the characteristics of X? • How has X changed over time? • What are the causes of X? • How has X dealt with Y?
Explaining and testing	• What is the relationship between X and Y? • What is the role of X in Y? • What is the impact of X on Y? • How does X influence Y?
Evaluating and acting	• What are the advantages and disadvantages of X? • How effective is X? • How can X be improved?

Research in Computer Science

Research in computer science involves working with and developing algorithms, data structures, cryptography, …

Cybersecurity

Artificial Intelligence

Human-computer interaction

Software engineering/architecture

Computer vision

Data mining

Activity time!!

Prepare a 2 mins pitch to explain to your peers your proposed research project and your research question

You can prepare a short powerpoint if you wish

The Research Continuum

Basic Research

Applied Research

BASIC	APPLIED
Theoretical problems	Practical problems
Lab setting	Real-world setting
Carefully controlled conditions	Limited control conditions
Results – limited direct application	Results - direct value

- Most scientists believe that basic research lays down the *foundation* for the applied science that follows.

Types of Research

Traditionally research is classed as either quantitative or qualitative

Qualitative –

used to examine questions that can best be answered by verbally describing how participants in a study perceive and interpret various aspects of their environment

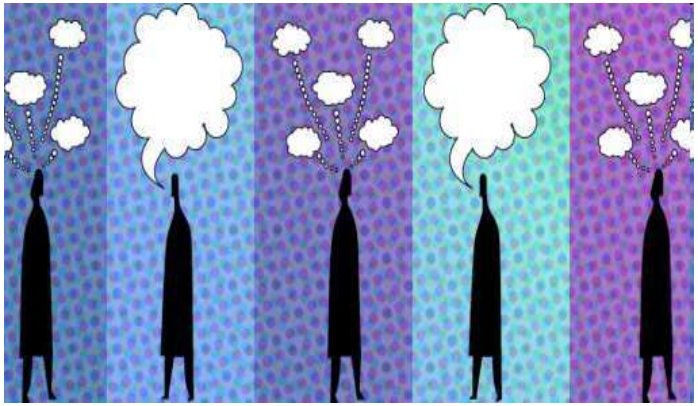
Quantitative -

used to examine questions that can best be answered by collecting and statistically analysing data that are in numerical form

Qualitative v Quantitative

Qualitative

Generally deals with words, images and the subjective



Quantitative

- Generally deals with numbers, logic and the objective

Mixed-Methods

Effect of team work on success in software architecture

Hyp: Team work will have a significant positive effect on success.

QUANTITATIVE

What are the emotional experiences in AI voice assistant users?

QUALITATIVE

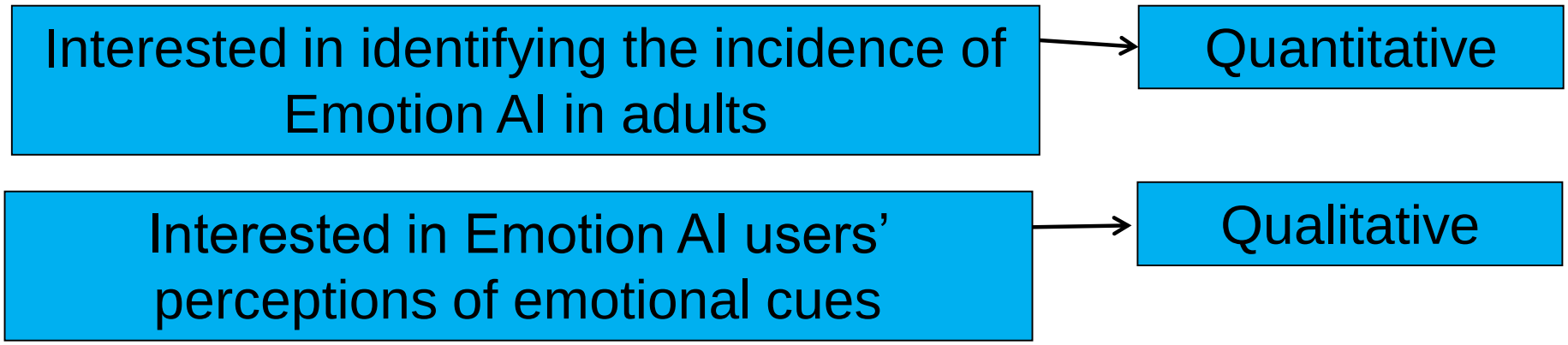
Activity time!!

What type of questionnaire would you prepare if you had to conduct this type of research?

Prepare a short questionnaire (5 questions)

Which approach should you use?

Decision depends upon the nature of the research question and the objectives of your research



There is no one 'better' approach, the approach should be dictated by the research question

Activity time!!

Think about your project and briefly explain

- What is the research problem that you have identified?
- What is the specific purpose of your research?
- How are you going to collected data (if applicable)?
- How are you going to analyse and interpret your data?

Research proposal

It should include:

- **Title**: your title should give a clear indication of your proposed research approach or key question

- **Background and rationale**:
  - background and issues of your proposed research
  - identify your discipline
  - a short literature review
  - a summary of key debates and developments in the field

- **Research question(s)**: You should formulate these clearly, giving an explanation as to what problems and issues are to be explored and why they are worth exploring

Research proposal (2)

It should include:

- **Methodology**:
  - theoretical resources to be drawn on
  - research approach (theoretical framework)
  - research methods appropriate for the proposed research
  - discussion of advantages/limits of chosen methods

- **Plan of work and time schedule**: You should include an outline of the various stages and corresponding time lines for developing and implementing the research, including writing up your dissertation

- **References**: list of references to key articles and texts discussed within your research proposal

Activity time!!

Prepare bullet points of your:

- Research question(s)
- Methodology
- Plan work