Research Methods in Computing

(COMP09092)

Lecture 3

Primary Research

Coursework:

It is a research proposal

- You don't actually develop the app/game, set up the simulation or conduct any primary research with organisations etc this year (i.e. now)
- You cover how you might conduct primary research or develop app/game etc and why
- Conducting the primary research / developing the app/game will take place in Hons Year or not at all if you leave after 3rd Year

Importance of Primary Research

Primary research (for example, research / development / simulation) requires careful **planning and implementation**

Examples of primary research can include be:

- **Undertaking interviews/surveys with organisations**
- **Design, development and evaluation of software prototype**
- **Development and evaluation of network simulation**

Importance of Primary Research

If it all goes wrong – **don't have time to go back and redo it!**

Your primary research should be **informed by the literature/technical review**

Key concepts, issues, themes should underpin your primary research

Importance of Primary Research

The **literature/technical review** should provide you with an idea as to **what key issues, factors, areas for future research are relevant to your research topic**

Literature/technical review should also give you an understanding **how previous authors/researchers examined an area**

What **research/development methods and approaches** did they use?

What were the main **lessons, findings and recommendations?**

Importance of Primary Research

The **link** between what is **already out there** and **your own research is very important**

It helps **situate** your work

It helps **'validate'** your work and provide **academic credibility**

Examples of How to Link Secondary and Primary Research

Example 1:

A paper(s) describe a study undertaken several years ago in similar area to your research proposal

Might be appropriate for you to adopt same or similar questions they used in interviews or surveys for your own study (properly referenced)

You can then compare your findings in a different geographical area or sample group with their findings – highlight areas of similarity or differences

Previous studies also help inform what might be a suitable research approach to adopt for your research proposal

Examples of How to Link Secondary and Primary Research

Example 2:

Testing the 'theory' discussed in the literature against some **examples of current 'practice'**

Your literature review enables you to compose a **list of key issues or factors** that are considered important to succeed in a particular area

You take this list and investigate whether they are present using **real-life case studies** that you investigate yourself

Does the 'theory' stand-up in real-world scenarios?

Examples of How to Link Secondary and Primary Research

If you are using a questionnaire – you can use the list of issues/factors as the basis for formulating questions

You can **show how questions relate to the literature**

Enables you to **justify your research approach and design of questionnaire**

Research Method

Often a **weak area** of the Hons project

Not sufficient to design your practical work with **little or no reference to ideas on research method – need to relate this to previous examples of work / literature in the area**

What you discuss in your research method section should be **directly relevant to what you do in your proposed research area**

Terminology

Some terminology:

In relation to defining '**research'**, according to Oates (2006. p5) research means "creating some new knowledge"

Kothari (2004. p1) refers to the Advanced Learner's Dictionary of Current English that defines '**research'** as "a careful investigation or inquiry specially through search for new facts in any branch of knowledge"

Research Proposal

Your proposed research does not have to be unique, but it should help in learning and understanding more about a specific area

As well help as place any results from your proposed research within a wider context relevant to your subject area

This helps you produce useful recommendations and conclusions if you actually undertake the research proposal as part of your Hons Project next year

Terminology

In terms of identifying what a '**methodology'** is, Saunders, Lewis and Thornhill (2009. p595) defined methodology as:

"The theory of how research should be undertaken, including the theoretical and philosophical assumptions upon which research is based and the implications of these for the method or methods adopted"

Terminology

More specifically '**research methods**' are defined by Kothari (2004. p7) as "all those methods/techniques that are used for conduction of research"

Research Approaches

3 commonly used research approaches have been identified, under the headings:

(1) Qualitative Research – small sample, examine peoples' opinions, usually involved **interviews** or **focus groups**, more indepth

(2) Quantitative Research – larger sample, less indepth, more structured in approach, involves **surveys**, some form of **statistical analysis**

(3) Mixed Methods Research – mixture of both

(i) Qualitative Research

Aim is to try and collect peoples' **feelings, beliefs, opinions, views** in relation to an area of study at the level of their **subjective understanding about the world**

Usually focuses on issues in **more dep**th with **fewer numbers of people**

Qualitative Research

Qualitative data **cannot usefully be converted into numerical form**

Qualitative data is expressed in **words** describing peoples' opinions, attitudes, feelings etc

Cannot be reduced to averages, maximum and minimum values or percentages

Qualitative Research

Qualitative data is often **rich in subtle insights into human behaviour** that are essential to **understanding** individuals, groups, organisations etc

Unearthing this depends on our **analysis of concepts** and **tracing complex interrelations** between variables we identify

Identify these from **interview transcripts** and **observation notes** etc, as well as literature

Qualitative Research

As with any source we need to make **judgements about their reliability**

They may be **atypical and incomplete**, or **one narrow opinion**

May leave more room for **different interpretations and valuations**

Need to develop a habit of **TRIANGULATION** using data from different sources relating to same situation to check for completeness and reliability

(ii) Quantitative Research

Usually targets a **larger number of people** using techniques such as **surveys and questionnaires**

Tries to develop large enough samples to make **specific overall statements** about the area of investigation according to the **data** collected

Asks **wider, more general questions** from much **larger sample** of population

Quantitative Research

Aim is to be as **objective as possible** by basing conclusions on **statistical findings and other measurable empirical data**

Situations or events you are researching must be capable of being expressed in **terms of numbers** in an order of magnitude which can then be analysed mathematically

(iii) Mixed Methods Research

Researchers may wish to collect both quantitative and qualitative data in the same studies

Frequently referred to as **‘mixed methods research’**

Reasons for Adopting Mixed Methods Research

Complementarity – seek elaboration, enhancement, illustration, clarification of results from one method with results from another

Development – seeks to use results from one method to help or inform the other method

Expansion – seek to extend the breadth and range of enquiry by using different methods for different inquiry components

Reasons for Adopting Mixed Methods Research

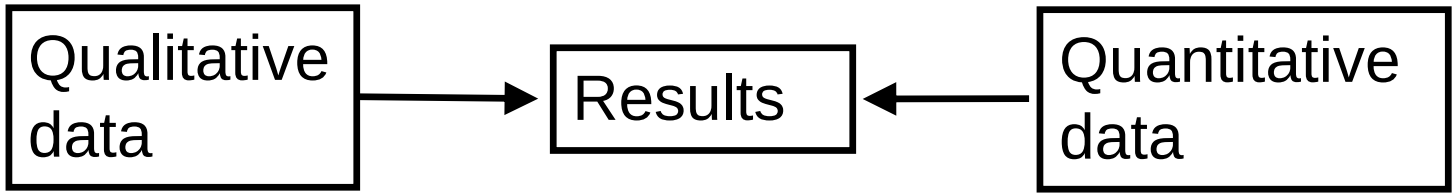
Triangulation or greater validity – triangulate findings in order that they may be mutually corroborated

Different research questions – quantitative and qualitative research can each answer different research questions

Context – qualitative research providing contextual understanding coupled with broader relationships uncovered through a survey

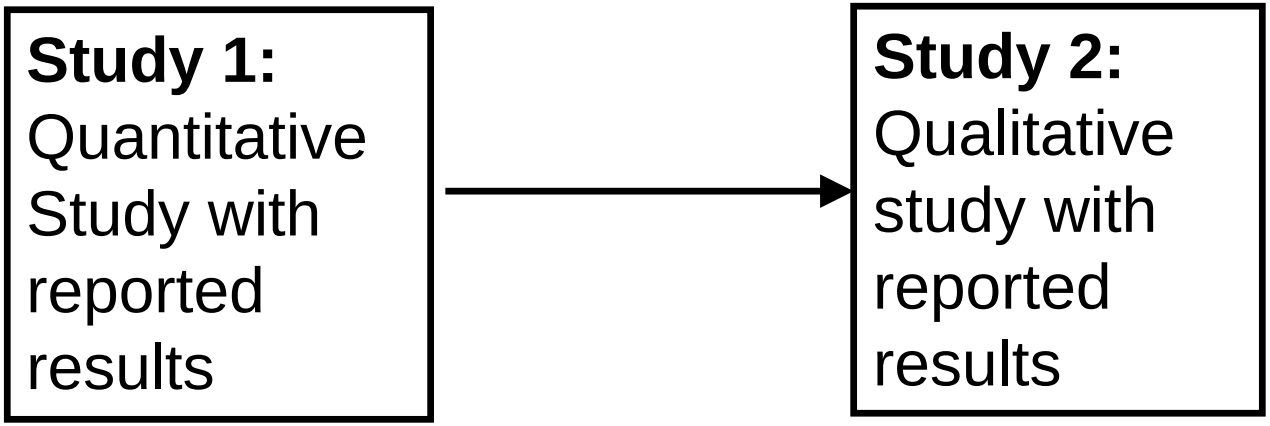
Mixing the data

Merging the data:



Examples of studies

Multiple Studies:

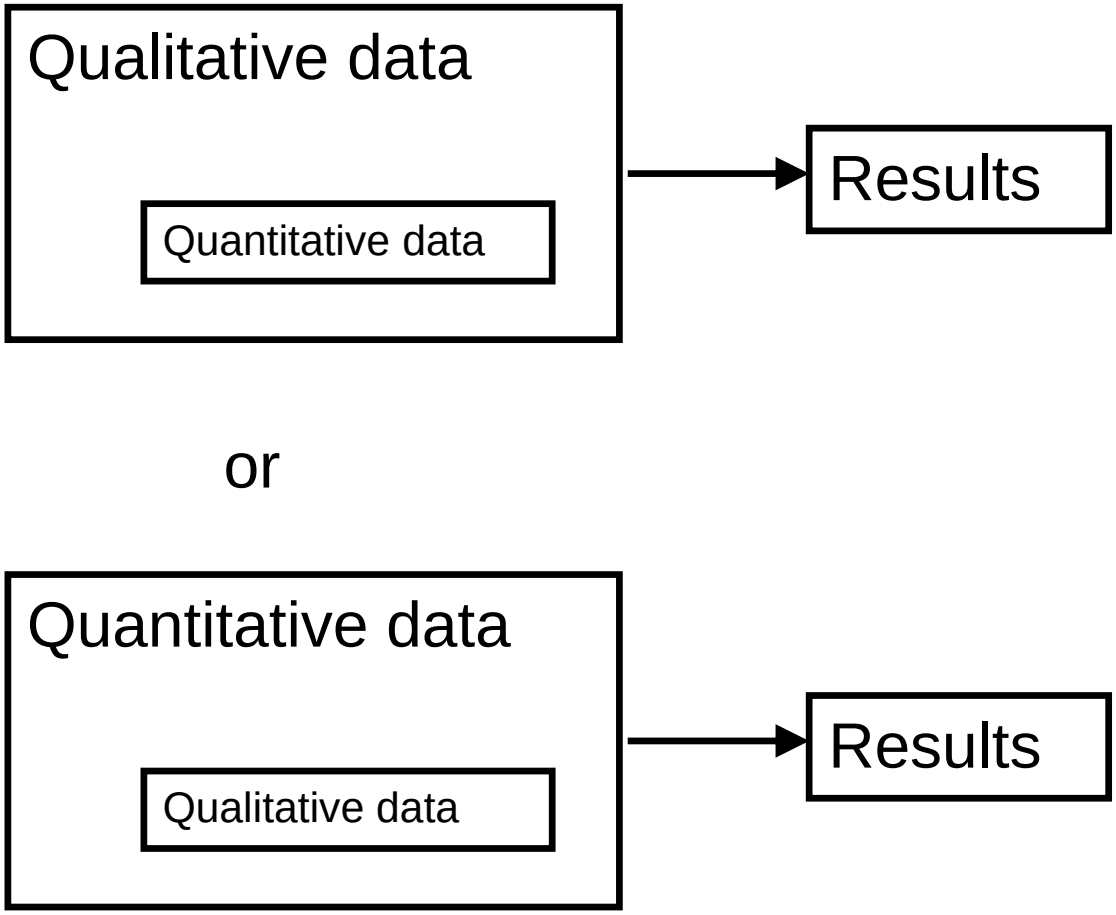


Mixing the data

Connecting the data:

Mixing the data

Embed the data:



Mixed Methods Research

Conducting mixed methods research is **not easy**

Takes time to collect both quantitative and qualitative data

Requires **clear presentation** of processes and results

Researchers are often trained in **only one form of inquiry** (quantitative or qualitative) – mixed methods requires you to know both

IMPORTANT

You need to make your **stance clear and justify it**

Is your research **purely** qualitative in nature? or…

Is your research **purely** quantitative in nature?

If adopting a Mixed Methods Research:

Is your research **primarily qualitative** in nature but for specific reasons will draw upon certain quantitative data as well? or …

Is your research **primarily quantitative** in nature but for specific reasons will draw upon certain qualitative data as well?

IMPORTANT

You need to **explain how you are going to do your research** and **why you are doing it in this way**

You will already be making decisions about your research method – the literature review which you are undertaking is an **important and influential part of your research**

Avoid writing up your research method section in a **general way** – instead you need to offer a discussion which is appropriate to your research proposal – i.e. **explain what approach you decided to use and why**

Probably a good idea to do some reading on research method

Specific ways in which you can investigate your chosen area, include:

- Interviews (structured and unstructured)
- Observation
- Focus Groups
- Surveys
- Questionnaires
- Case Studies

User Requirements and Software Design Methods

Often a **weak area** of the Hons project

Need to be clear as how you with gather user requirements (e.g. interviewing, focus groups, survey)

As well as what software design approach might be relevant to your prototype (e.g. user experience design, storyboarding, flow chart, UML etc)

Software Development Methods

Often a **weak area** of the Hons project

Some examples include:

- Waterfall
- Spiral
- Rapid Application Development (RAD)
- Prototyping
- Agile

IMPORTANT

You need to make your **stance clear and justify it**

Description of other relevant methods then justify your approach

IMPORTANT

Probably a good idea to do some reading on **how research/development/simulation (i.e. the primary research) is generally conducted** in your area

How is **testing & evaluation** in your area carried out?

Look at previous papers and literature

References

Kothari, C.R. (2004) Research Methodology: Methods and Techniques. New Delhi: New Age International Limited Publishers

Oates, B.J. (2006) Researching Information Systems and Computing. London: Sage

Saunders, M., Lewis, P. and Thornhill, A. (2009) Research Methods for Business Students. Harlow: Pearson Education Limited.