

WEEK 1

ACFA7004

Research Methods and Professional Development

Today's learning outcomes

- 1 Explain what is meant by research and distinguish research from routine information gathering.
- 2 Describe the main stages of the research process.
- 3 Identify characteristics of good research.
- 4 Recognise different purposes of research.
- 5 Begin to identify a potential research area or problem.

Opening question

When you hear the word 'research', what do you think of?

Write down THREE words or phrases.

Be prepared to share with the group.

There are no wrong answers at this stage.

What do we mean by research?

Research is a systematic and critical process of investigating a question or problem using appropriate evidence and methods.

The purpose is to develop new knowledge, understanding or insight.

Research can be academic, professional, applied, exploratory, evaluative or experimental.

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| 5 | Ethical: considers participants, society and wider impacts. | 10 | Communicable: findings can be clearly explained. |

Research is more than finding information

- 1 Searching Google for the recommended concrete curing time: information gathering.
- 2 Reading a journal article to understand a theory: learning.
- 3 Comparing five project reports: analysis. potentially research if conducted systematically to answer a question.
- 4 Testing how curing conditions affect concrete strength: research.
- 5 Systematically investigating barriers to MMC adoption: research.

Activity: Research or not?

In groups, decide whether each example represents research.

- 1 For each decision, explain WHY.
- 2 Think about: Is there a question? Is there a systematic method? Is evidence being generated or analysed?
- 3 Be ready to defend your answer: some cases may be 'it depends'.

Activity: Research or not?

1 Checking Air Quality Data

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2 Investigating River Pollution

An environmental researcher collects water samples from five locations along a river every month for a year to investigate whether pollution levels vary between upstream and downstream locations.

Activity: Research or not?

3 Biodiversity Survey

An ecologist carries out a biodiversity survey of a proposed development site to identify protected species before construction begins.

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4 Comparing Restoration Methods

A researcher compares three different methods of restoring degraded peatland and measures changes in carbon storage and vegetation over two years.

Activity: Research or not?

5 Recycling Behaviour

An environmental manager asks staff which recycling bin they use most often.

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6 Checking Waste Volumes

A facilities team weighs the waste produced by a building each week to check whether it is meeting its waste-reduction target.

Activity: Research or not?

7 Investigating Energy Performance

A researcher investigates the relationship between building occupancy patterns and energy consumption across 20 university buildings over a two-year period

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8 Occupant Satisfaction

A facilities manager surveys 500 building occupants about their satisfaction with the facilities and presents the results to senior management.

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| 2 | Describe: What does the situation look like? | 6 | Evaluate: Does something work? |
| 3 | Explain: Why is it happening? | 7 | Develop: Can we create or improve something? |
| 4 | Compare: How does one situation differ from another? | 8 | Test: Is an explanation or hypothesis supported by evidence? |

Research examples

- 1 Explore barriers to adopting Modern Methods of Construction.
- 2 Compare waste from traditional and modular construction.
- 3 Test recycled aggregate in concrete.
- 4 Compare water quality across river sites.
- 5 Investigate how land use relates to flood risk.
- 6 Evaluate biodiversity in restored habitats.
- 7 Compare planned and reactive maintenance costs.
- 8 Explore how workspace conditions affect user satisfaction.

The research process

- | | | | |
|---|----------------------------------|----|--------------------------|
| 1 | Research area | 6 | Research methods |
| 2 | Research problem | 7 | Data collection |
| 3 | Research question | 8 | Data analysis |
| 4 | Literature and existing evidence | 9 | Findings and conclusions |
| 5 | Methodology and research design | 10 | Communication |

A simple research journey

Idea. Problem. Question.

The stages influence each other.

Evidence. Method. Data.

A strong research question should drive methodological decisions.

Analysis. Conclusion.
Communication.

The method should produce evidence capable of answering the question.

Activity: The research process

- | | | | |
|----|-------------------------------|----|----------------------|
| 01 | Identify the problem | 05 | Collect data |
| 02 | Develop the research question | 06 | Analyse data |
| 03 | Review literature | 07 | Draw conclusions |
| 04 | Select methodology | 08 | Communicate findings |

Which stages might need to change later?

Research is not always linear

- 1 The process may look linear in a diagram, but real research is iterative.
- 2 Literature may reveal that your question is too broad.
- 3 A proposed dataset may not be available.
- 4 Ethical issues may require a change of method.
- 5 Pilot work may show that a questionnaire or interview schedule needs revision.
- 6 Changing the design in response to evidence is often part of good research.

What makes research 'good'?

- | | | | |
|---|--------------------------------------|---|----------------------------------|
| 1 | Systematic | 6 | Ethical |
| 2 | Transparent | 7 | Critical |
| 3 | Rigorous | 8 | Aware of limitations |
| 4 | Appropriate to the research question | 9 | Open to alternative explanations |
| 5 | Evidence-based | | |

Activity: Spot the problems

Teaching scenario

A researcher wants to find out whether construction workers prefer online training.

They ask 8 people from their own company whether they prefer online training.

Seven say yes.

The researcher concludes:
'Construction workers prefer online training.'

What problems can you identify?

What might be wrong?

- 1 Very small sample
- 2 Only one company
- 3 Potential sampling bias
- 4 Unclear participant selection
- 5 Potentially leading or ambiguous question
- 6 No evidence that the sample represents construction workers generally
- 7 Important variables may have been ignored
- 8 Conclusion is broader than the evidence supports

Research in professional practice

Research is not only for universities or academic careers.

Professionals regularly need evidence to make decisions.

Applied research can address practical problems and improve professional practice.

Postgraduate research can connect academic rigour with real industry problems.

Professional and research problems

Professional concern

'There are lots of delays on construction projects.'

'MMC is not being adopted enough.'

'Flooding is getting worse.'

'Construction waste is a problem.'

Researchable question

What are the main causes of delay on local authority projects in Wales?

What factors influence MMC adoption among UK contractors?

How has increased rainfall intensity affected urban drainage performance?

What factors influence waste reduction on construction projects?

Activity: A first research question

Choose a professional or academic problem relevant to your discipline.

- 1 Write the problem in one sentence.
- 2 Ask: Who or what is affected?
- 3 Ask: Where does it occur?
- 4 Ask: What specifically do I want to understand, compare, explain or test?
- 5 Write a first attempt at a research question.
- 6 Do not worry about getting it perfect: refinement comes later.

Activity: Your research area

My broad area of interest is...

- 1 A problem I have noticed is...
- 2 I am interested in finding out...
- 3 Who or what might this affect?
- 4 What evidence might I need?
- 5 Keep this rough: it is a starting point, not a final proposal.

The researcher's decisions

A research question is not chosen in isolation. You need to consider:

- 1 What is already known?
- 2 What evidence is available?
- 3 Who can provide the data?
- 4 What methods could answer the question?
- 5 What resources and time are available?
- 6 What ethical issues might arise?
- 7 What can realistically be completed?

Research quality: questions to keep asking

- 1 Is this a worthwhile question?
- 2 Is the question clear and focused?
- 3 Does the evidence actually answer the question?
- 4 Is the method appropriate?
- 5 Could bias influence the findings?
- 6 Are the conclusions justified by the evidence?
- 7 What are the limitations?
- 8 Could another researcher understand how the study was conducted?

Five things to remember

- 1 Research is more than finding information.
- 2 Good research is systematic, critical and evidence-based.
- 3 Research starts with a worthwhile problem or question.
- 4 The method must be appropriate to the question.
- 5 Research is iterative: your project will probably change as you learn more.