

Research this is it!



Noordhoff

Ben Baarda & René van Vianen

4th edition

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Foreword

‘I don’t have any special talent. I’m just curious.’

Albert Einstein (1879–1955), theoretical physicist

This is the fourth, fully revised version of *Research this is it!* With this book, we want to arouse your curiosity about everyday issues and to find the beginnings of an answer in a scientifically sound way.

Research this is it! Is intended as a manual for understanding and being able to conduct research in higher education. It contains all components for conducting research: from the design of a study to the presentation of a final product. Compared to the previous editions, the form and content have changed. Important changes in this edition are:

- Eight chapters form the core of this book and these chapters follow the process of carrying out and accounting for research. We start with an explanation of the different types of research and from there we progress from exploring an issue, exploring the issue in theory, using different designs and methods to analysing quantitative and qualitative data collection up to describing the outcomes of the research.
- In this book, we make a distinction between the different goals of research. We have identified these with the verbs: explore, explain and change. These research goals determine your approach to the research, the questions you ask, the designs you choose and the methods you apply. So exploring, explaining and changing as a goal is the thread running through all the chapters.
- In *Research this is it!* more space has been given to the aim of research to solve and change existing complex issues. In higher education, we talk about having an impact or realising impact, among other things. So there is more attention for forms such as design and participatory action research, with the aim of changing.
- In the line of reasoning of the goal of research (exploring, explaining, changing), in the various chapters, we peel the ‘onion’ to reveal which choices result in the use of different designs and methods.
- Extra attention is given to scientific and non-scientific reasoning (in chapter 1) and the ability to critically examine articles or studies found on a subject (in chapter 3).
- In analysing the data (both quantitative and qualitative), we opted to use Excel. Excel is a programme that is accessible to every student and teacher and basically offers the possibilities to analyse the data.

- In this version, attention is given to the use of AI in exploring the issues and the possibilities that exist for analysing (qualitative) data. Developments in this area are moving fast; we particularly attempt to emphasise the possibilities and the limitations.
- Each chapter is preceded by learning outcomes. After each paragraph, there are assignments for the student that are in line with the learning outcomes and for the student are aimed at working concretely on the research plan or the report on the research. At the end of each chapter, you will find a summary that ties in with the previous learning outcomes.

Rewriting a book, like conducting and reporting on a study, is a quite a task. A task in which different people have been involved in the delivery of ideas at different times. These ideas lead to insights and have been included in this book.

Giséla, Simone, Jessica, Jo-ann, Maud, Carli, Hilde, Joos, Merle, Fedor, Jochem, Pieter, thank you for sharing your insights.

July 2024
Den Haag, Wijk bij Duurstede

Ben Baarda, René van Vianen

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Research this is it!

Learning objectives or outcomes:

- You know that research is an everyday phenomenon.
- You know the difference between scientific and non-scientific research.
- You can identify the possible directions within the research and you know how to place published research in a direction.
- You know the difference between quantitative and qualitative research.
- You understand why having an effect or achieving impact is part of higher professional education.
- You understand that there are different strategies to achieve practical innovation and that these are related to the chosen direction in the research.
- You know what parts a research proposal consists of.

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1.1 An inquisitive attitude every day

Carrying out research is an everyday occurrence. You can distinguish between searching, investigating and researching. Why did you choose this course? You probably started by checking out one or more courses on one of the search engines. Where are the courses provided and what is the study programme (*searching*). Based on this, you probably compared different courses and made an evaluation. That's called *investigating*; you become more specific and you may value one study more than the other. Or maybe it's easier to get an (affordable) room in one city than in another. Or you can choose to continue living with your parents and opt to study close to where you live. You probably made your decisions based on an inquisitive attitude. You've compared the elements that are important to you, and you may have talked about them with friends and family before making a choice. This is doing research on a small scale (micro level). You can also base your choice on *research*. Is your choice based on how satisfied other students are with the course or the job market perspectives? The data on student satisfaction is collected by having students of a study programme fill in a digital survey, for example, about the content, the lecturers, the planning and the perspectives. This collected data is published every year (by an independent institute) and students can base their choice on that. The faculties also use this data to change their study programme. Researching is about systematically collecting data using methods and reporting on this data and drawing conclusions from that. This generally leads to recommendations. The objective of carrying out research is to improve the existing situation. In higher education, research is often aimed at improving or changing existing practices. A client (e.g. a school) has an issue, a question or a problem and wants an investigation into this issue and at the same time probably a solution. You then come up with an action plan for the research, consult sources on the subject (e.g. bullying), collect data, draw conclusions and through this cyclical approach you know how to contribute to solving the issue. This chapter discusses the many manifestations of conducting research.

Assignment 1.1

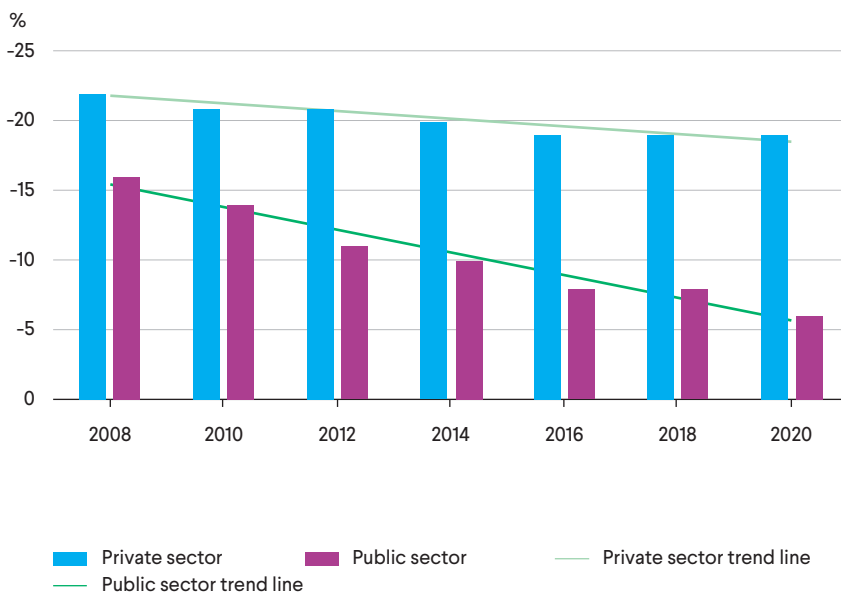
Write down for yourself what decisions you made today? Ask yourself how you made these decisions? Was it routine, intuition, or did you gather information before making a decision? Based on what information did you make this decision? Was this based on research?

1.2 Explore, explain, or change?

Research always has a specific goal. This is called the objective of the research. When you talk to your client(s) about your research, it is important to know which direction the client has in mind and where the boundaries of the research lie (for your client). There are three possible directions within the research:

- 1 explore
- 2 explain
- 3 change

Unadjusted wage differences between men and women, 2008-2020



Source: cbs

In recent years in the Netherlands, the wage gap between women and men has been in the news several times. According to research, men earn more than women in comparable functions. The wage gap is illustrated below in the example from the CBS (Statistics Netherlands), by presenting the difference in the wages of women compared to men in the public and private sectors. You can see that the difference (in total) has decreased slightly over the years.

The article distinguishes between the public and private sectors. (...)

'In both these sectors, women's average hourly wage was lower than men's in 2020. Women in the public sector earned on average nearly 2 euros per hour (6 percent) less than their male colleagues. In the private sector, they earned almost 5 euros (19 percent) less. Two years previously,

the public sector gender pay gap was still 8 percent; the gap in the private sector remained unchanged.

Although year by year, the pay gap decline is modest, there has been a linear decrease

in both private and public sector since 2008. These developments are statistically significant. It is therefore indisputable that the wage gap has narrowed in the period from 2008 up to and including 2020.

Ad 1 Explore

In an exploratory study, the central question is often how large a problem is, what the characteristics are and how people think about an issue. One example is the difference in the wage gap between men and women. A first question could be, for example, how big this difference is. And does this difference occur over several years? Is there a difference in the wage gap between the business community and the government? Is the wage gap smaller if you correct for the number of FTEs that men or women work? What role does age play in these differences?

These questions are mainly called *exploratory* or *inventory* questions. The point is to form a good picture of a certain issue. The question that plays a role in almost every study is: how big is the problem actually? What are you researching? Based on these exploratory questions, you conclude whether the problem is relevant and whether it is worth researching.

Ad 2 Explain

The above data say nothing about the question of why this wage gap between men and women exists. Do mechanisms such as unequal treatment play a role? Are women less demanding in negotiations about pay rises than men? Do other mechanisms, such as other choices that women make in their lives, play a role? Do men change jobs sooner and more often and do they then make sure they have a different starting position? Explanation is more about the question why and what motives or reasons people, teams or organizations have. As a researcher, you look for the why question and this requires a different approach to your research. You look for connections, or explanations, for example for the differences in the wage gap.

Ad 3 Change

The goal of the research may also be to bring about change in often complex, tough phenomena. The wage gap has existed for years and according to research by Statistics Netherlands (CBS), it is shrinking within the government, but it still exists. For research that focuses on change, the approach is often to actually tackle the question with a large number of people involved. For example, consider research within a government agency where differences in wages exist. First, the researcher investigates whether the question is an issue (explore), and then looks into what is causing these differences (explain). Suppose the researcher discovers

together with the employees that bias plays a role in the interviews, for example because the HR officers unconsciously consider the possibility of pregnancies. Together with the HR officers, the researcher focuses on creating awareness for these types of errors in thinking and, together with them, designs a new procedure for the equal grading of new and existing employees. Research can therefore also focus on improving or changing existing practices.

Assignment 1.2

Check out today's newspaper or news website. Which articles that you come across are based on research? What goal is central to the research? Is it more about exploring, explaining or changing?

1.3 Quantitative and qualitative research

This section is about the answers to the following questions:

- What is quantitative research?
- What is qualitative research?
- What are the differences between quantitative and qualitative research?

Quantitative research

Quantitative
research

If the research question is narrow and you know what you can expect in terms of content when you interview or observe, you usually do quantitative research. For example, the research into the wage gap is mainly concerned with inventory research questions that provide a better picture of the size of the wage gap and possible differences caused by age, education and years of work experience. A research question that also lends itself to quantitative research is the assessment of an intervention carried out on the effectiveness of the intervention, such as the effect of an advertising campaign on the sales of a specific product. You usually collect this by consulting files or by questionnaires or observations of the persons involved about the effect of a treatment (the change in certain substances in the blood, the heart rate, the scores on a test or the purchase of a certain product). So you know what you are looking for and what you expect and therefore also what you need to measure. In such cases you do quantitative research.

In quantitative research, you ask your respondents the same questions each time or you observe the same type of behaviour each time according to fixed guidelines. This means that you know which questions you are going to ask, or what the observation categories are, before you start collecting the data. In quantitative survey research, you often already know which answers the respondents will give. As the name suggests, in quantitative

research the research data are numbers, usually in the form of a data matrix. You often analyse these systematically using statistical software, such as Excel or SPSS. In a study into the development of the wage gap, the numbers are presented in the form of a bar chart (frame 1.1).

Quantitative research is research in which the research material consists of numerical data that are statistically analysed to answer the research question.

You may wonder what the relevance of quantitative research is if you already know in advance what the results will be. Quantitative research is not only about whether there is a relationship between, for example, RSI complaints and the amount of screen work that people do but also about how strong that relationship is. If 80% of RSI complaints are explained by the amount of screen work, then it is clear that this is an important point to target in reducing RSI complaints. However, if 30% of complaints are explained by the amount of screen work, then you have to look for other factors that explain the occurrence of RSI complaints.

Qualitative research

Qualitative
research

In the case of more open-ended questions, you conduct qualitative research. One example of this is research into the question of why some young people end up in crime. The research question is usually broad and there is relatively little prior knowledge. The result is also that you often *do not* work with a fixed questionnaire or observation list. Your respondent can give you new ideas or insights, which will make you ask questions or pay attention to things you didn't think of beforehand. Qualitative research is mainly about gaining *insights* and less about hard, numerically substantiated facts. In a qualitative research report, you will therefore mainly find descriptions and hardly any numerical tables or graphs. In qualitative research, detailed interview and/or observation reports form the starting point of the analysis. Texts, photos and videos can also be an important source of data.

Qualitative research is research in which problems in and of situations, events and persons are described and interpreted using data of a qualitative nature, such as perceptions, experiences and meanings, collected through open interviews and/or participatory observation and/or through the use of existing documents.

There are different views on qualitative research. As a result, there are also different forms of qualitative research. The most common view of qualitative research is that you have an open mind to what you encounter in the research field.

Open attitude

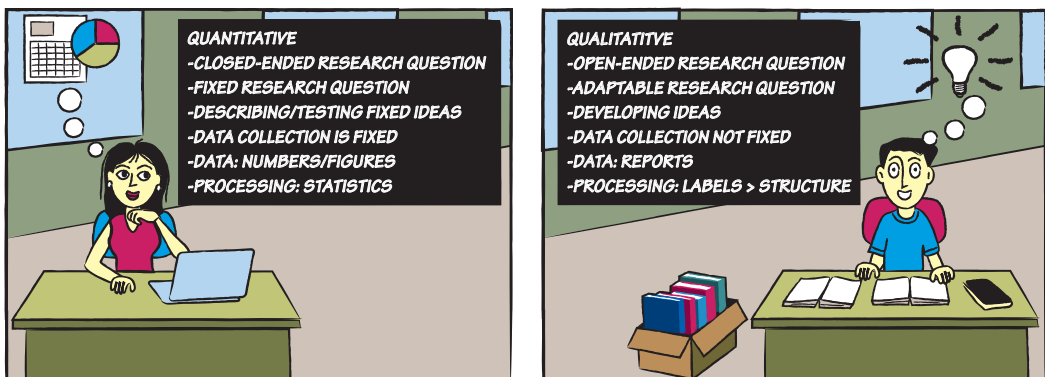
If you are completely open to what you encounter in the research field, you will learn from the research. You allow yourself to be surprised by what you see. The criticism that you are never completely neutral and unbiased is justified. Perhaps, as a researcher, you have experienced problems with a topic you are going to research. There is then a risk that you will observe selectively. In qualitative research, you as a researcher are the most important research instrument, and as a person you are never neutral.

In qualitative research, the research data that you analyse are usually texts. These can be typed interviews, but also observation reports or diary fragments. These research data are usually first condensed by attaching labels to them. The labels are then classified and categorised. In this way, you try to find a line in the data.

Differences between qualitative and quantitative research

The differences between qualitative and quantitative research are summarised in Figure 1.1. You can see that the choice between qualitative and quantitative research is determined by the research question.


Figure 1.1 The characteristics of and differences between quantitative and qualitative research



Mixed methods

Incidentally, a combination of quantitative and qualitative research is often used, the so-called mixed methods approach. In evaluations, you often see that people are asked to indicate on a scale of 1 to 5, for example, how satisfied they are with a delivered product or service (quantitative), after which they are asked to explain this in their own words (qualitative). Figure 1.2 is an example of this.

Figure 1.2
Example of the
use of mixed
methods in a
questionnaire

1. How satisfied are you with the advice we gave you? 

	1. very dissatisfied	2. dissatisfied	3. a little dissatisfied	4. satisfied	5. very satisfied	N/a
Satisfied with the promptness of the advice	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satisfied with the content of the advice	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satisfied with the usefulness of the advice	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Satisfied with the price of the advice	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Would you describe this in your own words below

It took a long time before I received the advice. And it was actually what I had said myself. I think it's ridiculous that I have to pay for advice that I gave myself.

Whether it concerns quantitative or qualitative research, in all cases it must be verifiable how a researcher arrives at his conclusions.

Reproducibility
requirement

For quantitative research, the reproducibility requirement applies. Your research report should be structured in such a way that someone else is able to repeat the research. So it should be clear how you found your respondents and which research tools you used.

Verifiability
requirement

For qualitative research this is a bit more difficult. Particularly when you work with open observations and interviews, no two interviews or observations are the same. However, as a qualitative researcher you must also make it clear how you arrive at your conclusions. These conclusions must be *plausible* and your working method must be *transparent*. This is called the verifiability requirement. Qualitative researchers often mention the interview and observation reports in appendices to their research report and give examples of how they have analysed them in the text.

Assignment 1.3

Check the selected articles from today's newspaper or news website again. How would you characterise the research in the articles? Is it quantitative research or qualitative research, or are both types of research used? Do you think the way in which the information was collected (quantitative or qualitative) is appropriate to the issue? Or was there another way to collect data?

1.4 Recognising non-scientific claims

Conducting research means arriving at conclusions and/or solutions for practical issues based on scientifically sound methods. You want the conclusions and solutions to be valid, in other words, that they provide

an answer to the questions. Conducting scientific research always involves assuming a certain degree of uncertainty. You try to make or keep this degree of uncertainty as small as possible. Statements always contain a certain degree of uncertainty and are 'true' at that point in time. New research can always lead to new insights and to adjusting a theory. Statements in the natural sciences are more 'certain' than statements or claims in the social sciences, where many more variables play a role and influence the issues.

Therefore, for each piece of research, it is important to consider which claims are made in which way, and how they are substantiated. How can you recognise non-scientific research? There are a number of aspects you can pay attention to in order to distinguish non-scientific research from scientific research (Biemond, 2023). You can read which aspects these are below.

Unfalsifiable statements

In scientific research, you almost always work with hypotheses or assumptions that can be contradicted by other research. An example of such a statement is: all swans are white. You can contradict this statement by looking for a black swan. Karl Popper, a well-known philosopher of science, called this the principle of falsification. In pseudoscience, unfalsifiable or unprovable statements occur. One example is the statement: it is raining or it is not raining. This statement is always true. Other examples are vague statements such as: this drug supports the body's natural ability to heal.

Anecdotes as evidence

Citing anecdotes as evidence or to support the results of research occurs frequently. This is because people draw on their own experiences and then see this as evidence to support or deny the results. Drawing on personal experiences seems credible to others. Arjen Lubach has a hilarious video about anecdotal evidence. We know from scientific research that people who smoke die younger than non-smokers. But not Arjen's grandmother, who is over ninety and still smokes a pack a day. Examples like these are used quite regularly in everyday practice. The tricky thing is that personal experiences can be misleading, the stories are difficult to compare and people may exaggerate. The greatest danger is that personal experiences do not have to be representative at all, if you reason from the perspective of the entire population. Arjen's grandmother lived to be over ninety, but many other grandmothers and grandfathers who smoked, died before they were ninety.

Cherry-picking

So scientific research is characterised by refutable statements and therefore looks for research that contradicts an outcome. Scientifically

sound research is characterised by a discussion in which possible research or theories that claim the opposite are discussed. A researcher weighs up the pros and cons and takes a position based on the scientific research. Pseudoscience only mentions the research and theories that confirm its own position. The confirmations are often presented triumphantly ('you see') and research that would refute the position is ignored.

Technobabble

In scientific research there is an argument, a common thread that logically and consistently connects the theory, the questions, the methods, the results and the conclusions. Pseudoscience tries to make a reliable impression by imitating the terms and language of science, but it is usually not entirely correct. They use scientific terms incorrectly or their reasoning is not logical and consistent. The terms they use are technobabble and often involve illogical reasoning, such as: 'The electromagnetic radiation from the wind turbines causes a shift in the subatomic brain particles of the birds, disrupting their flight movements.' Do you know what this is about and what connections are being made?

Lacks a plausible mechanism

Is a scientific argument logical and consistent, so that you can test it against other or new research, criticise it and perhaps even reject it? Pseudoscience provides arguments based on the motto 'it just works' or 'if it doesn't help, at least it won't hurt'. In science (as opposed to pseudoscience), you look for effective mechanisms, you explain these to others and often look with others to find out how the puzzle pieces fit together. During the corona pandemic, various people (including doctors) used various remedies for curing an infection. It was not clear in advance which mechanisms might work for all the remedies. In retrospect, some remedies turned out to be ineffective. The rule with these types of, sometimes spectacular, 'discoveries' is that the less plausible the mechanism is in advance, the stronger the evidence has to be.

Resists change

Here, pseudoscience involves relying on knowledge, insights and experiences from centuries ago. This happens regularly in homeopathy, for example, where knowledge of the effects of plant extracts goes back centuries, but partly because of the current standards of proving the effectiveness of remedies does not always lead to scientifically substantiated claims. Pseudoscience then continues to rely on knowledge acquired centuries ago and continues to make unscientific claims. This point often goes hand in hand with the point above, where the argument is: if it doesn't help, at least it won't hurt. Scientific research is a continuous quest and converts previous claims into new claims. It is a quest in

which new discoveries lead to a higher effectiveness of, for example, the treatment of various types of cancer.

Extraordinary/exaggerated claims

Our problems are often complex and there are many variables associated with the problem. In our society there is often no clear solution to existing problems. Therefore, be careful with claims that are 'short-sighted', seem simple, but do not tell the whole story. Pseudoscience promises extraordinary benefits with insufficient evidence. Scientific research provides different answers and nuanced stories. These are sometimes more difficult to understand and do not provide the desired simple answer. That is research!

Profess certainty

Scientific research involves learning to deal with uncertainty. The claim is true until another study with a different theory claims or proves otherwise. That is why scientific knowledge advances over time, it develops new insights. In this context, scientific philosopher, Kuhn, writes about new paradigms that arise over time because scientific knowledge develops and therefore does not sell absolute certainties. Pseudoscientists talk of 'proof' and present ideas with complete confidence, they present their ideas and evidence with no reservations. This is attractive to anyone who cannot or does not want to handle a certain degree of uncertainty.

Commits logical fallacies

Arguments that contain errors in reasoning occur even among scientific researchers. Pseudoscience is characterised by more fallacies that have not been presented to other scientists. Science gives others the opportunity to remove fallacies from the claims by working with 'critical friends'. Published scientific articles are generally 'peer-reviewed' by other researchers. Pseudoscience uses words like 'natural', suggesting that something is automatically good for you, or points to something that has existed or been used for a long time so it must be good for you.

Lacks adequate peer review

Checking of scientific articles by other scientists ('peer-review') is common in science. Scientists mainly publish their results in articles, books or at conferences. Pseudoscientific claims are often presented directly to the public through books, websites, social media and television. Sometimes the reach is increased because the media uncritically adopt the claims. People get the impression that this is normal scientific knowledge. Just look at the headlines above an article that is based on pseudoscientific research. What does it say and what is the research actually based on? It is therefore important that you learn to critically examine an article on the basis of criteria.

Conspiracy theories

It is necessary to be extra alert when researchers (sometimes with a scientific background) present themselves as moral crusaders and invoke plots and conspiracies against covering up the truth. The population is being denied the truth. The problem is that the researchers do not adhere to the rules of science.

Scientific research is certainly not without errors. It is and remains human work. Scientific research works along generally applicable principles of verifiability and transparency, which means that the reasoning and assertions can be checked and also refuted.

Assignment 1.4

Find a news article about the 'effects of homeopathy'. Consider the article in terms of the points above. Which of the above points do you come across in the article? How does that manifest itself?

How could research into homeopathic remedies be carried out in a scientifically sound manner? Do you have any ideas about that?

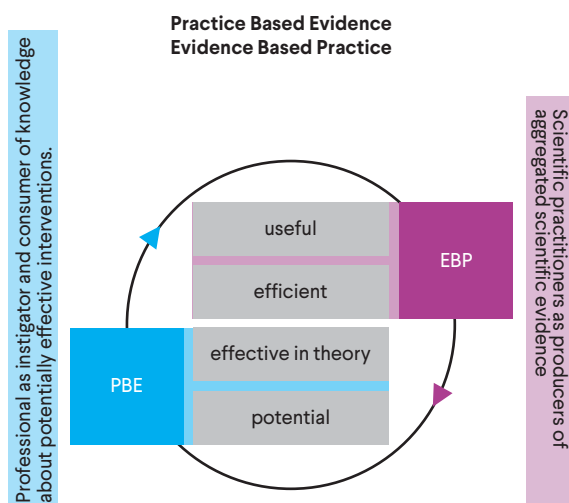
1.5 Evidence Based Practice or Practice Based Evidence?

In the health sciences and social sciences, you come across the terms 'Evidence Based Practice' and 'Practice Based Evidence'. You also come across the latter term – Practice Based Evidence – in education under the term 'Evidence Informed Based'. Evidence-based working emerged in the 1990s and means that professionals act on the basis of the best available evidence. This evidence is preferably collected by a study, in which control and experimental groups are used (the so-called RCTs). Through this design, this study provides clear evidence for the effectiveness of a treatment or a medicine. In the health sciences, there are numerous guidelines for treating various diseases, based on the best available 'evidence' and many universities conduct ongoing research into this. The aim is to assess whether treatments or medicines can be used effectively and efficiently for the groups of patients. Science takes precedence.

In the social sciences, but also in education, the effectiveness of not all interventions can be determined unambiguously. For example, there are too many influencing variables, which means that any experiments are subject to disruptive influences. Or it is not ethical to work with an experimental and a control group. For example, you cannot place some children with foster families and others in a home, just to measure the different effects. In short, in many questions about whether a certain intervention is 'wise',

professionals act on the basis of the best available evidence from practice. This may be the experiences of a group of professionals or a study that has not as high a degree of scientific evidence. The possible interventions are then effective in theory and can potentially be deployed.

Figure 1.3
Difference
between
Evidence Based
Practice and
Practice Based
Evidence



Source: Verhoef (2016)

The two practices can reinforce each other. So, in case of a less common situation or one where little research has been done, the professional makes a decision for an intervention and acts on the basis of knowledge of potentially effective interventions. By doing research on this again, the situation may arise in which scientific evidence is provided for the choice of this intervention for a group of clients or patients. If scientific research indicates that the intervention is effective and can be deployed, this again influences the professionals' choices.

Assignment 1.5

Look for a guideline in health care about the treatment of some disease or look at the guidelines for youth care. Please read them. Do they describe what proposals for interventions are made and on the basis of what evidence are they proposing this intervention? How transparent is the consulted guideline regarding the scientific evidence for an intervention?

1.6 Have an effect, achieve impact or create added value

An important question for a student in higher education is increasingly how impact is achieved in existing practice.

Higher education has the following tasks:

- providing practice-oriented research
- transfer of acquired knowledge and innovations to society
- a contribution to the development of a field of study

You are educated as a professional for everyday practice and you will become part of it. In research in higher education, you are expected to contribute to innovations, adopt an investigative attitude and come up with designs for a practical innovation. Research where it is up to the client to adopt the recommendations or not, with the risk that the research report will proverbially 'end up in a drawer', is disappearing. There is more room for a researcher who also contributes to practical innovations as a professional and change agent. Research can serve that purpose within higher education and it is up to the researcher to carry out the research in a scientifically responsible manner.

What does having an effect, achieving impact or creating a movement actually mean? If you consider impact in the sources, you will come across models in which impact is mainly interpreted as: in the long term in time and reaching everyone in the area and that a behavioural change actually takes place in the system, for example: if the research assignment is to reduce the wage gap, then achieving impact means the wage gap is actually reduced. This is generally an unattainable perspective in the context of a research assignment (within the framework of graduating in higher education). Various authors (Sivertsen, Meijer, 2020 in Van Vliet, 2022) distinguish between 'normal' versus 'extraordinary' societal impact. 'Normal' impact is more about valuable interactions between researchers, clients and those involved in the research, through which knowledge is generated and used to arrive at other, better practices. This can be a first step towards 'extraordinary' impact: 'more rare incidences where traditional and typical or new and untypical interactions between science and society have unexpected widespread positive or negative implications for society' (Sivertsen & Meijer, 2020 in Van Vliet, 2022). In other words: it is the outcomes or findings in a study that can sometimes make an unexpected and major contribution to society, without this being planned in advance (for example, the research of Marie Curie or Pasteur). As a researcher, it is therefore a search for the degree of effect and this contribution may be larger or smaller. Your contribution also depends on your 'circle of influence'. For graduation purposes, you focus mainly on the short term and you focus on the project participants. Your research can have an effect in the medium term, the products or ideas can be further developed and that can result in an increase in knowledge. It takes patience to achieve impact, where changes 'are only realised many years after a research project has been completed' (NWO, 2019, p. 2).

Universities of applied sciences have developed their own view on achieving impact and use the term 'have an effect' for this (Association of Universities of Applied Sciences, 2023). This is defined as:

'The influence of both the research process and the research results on education, practice and society.' This means that every practice-oriented research already has an effect on practice and society during the research process.

Assignment 1.6

What requirements does your college or university place on conducting research in the final phase of the degree programme? What direction in the research is involved (explore, explain, change)?

1.7 Process to achieve practical innovation

We are dealing with major social challenges and transitions. These are not easy and are often referred to as 'tough' issues. Examples of such issues include climate change, which raises questions about how we should switch to a sustainable and fundamentally different way of living and working. In recent decades, digitalisation has caused enormous changes in our daily lives, leading to new social challenges but also providing meaningful innovations (for example, the use of a wide range of technological aids in elderly care). And look the use of all kinds of artificial intelligence programmes. These are major social issues where research can play a role in making progress. On a small scale by working on innovations of existing practices and on a large scale by having an influence on the social challenges of our time.

Another phenomenon is that, due to social changes, the issues are becoming more complex and can often no longer be approached from a single discipline. As a student, you increasingly work with others on research to arrive at a solution. Increasingly, students from other courses participate in the research and work to come up with multidisciplinary solutions to tough issues.

han.nl consulted on 12 July 2023

Creating an exercise book for children who are in isolation

'Creating an exercise booklet for children who are in isolation.' That was the assignment taken from daily practice that was on the list of subjects of the module Practical Innovation Care and Welfare (PZW). 'A great opportunity to tackle the mobility side in addition to pedagogy,' thought Pedagogy student, Lisa Pouvrassau immediately.

The client for this project was the Rijnstate Hospital in Arnhem and it deliberately selected a Pedagogy student and a Physiotherapy student from the registrations. Physiotherapy student Jony Meijerman knows: 'If we only had students from the Physiotherapy programme or only Pedagogy

students, we would never have achieved the result that we have now achieved.' Lisa nods in agreement and adds: 'We did not know each other, but we complemented each other from our own field, which allowed us to surpass ourselves.'

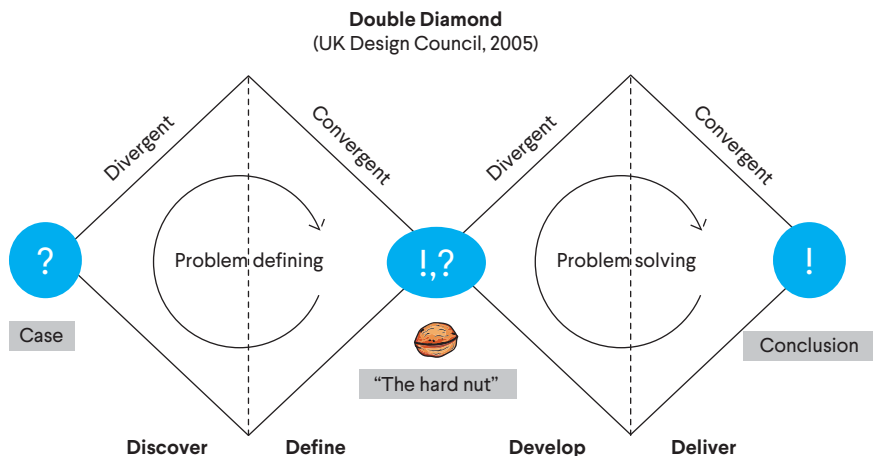
There are several possibilities for arriving at practical innovations. In the following subparagraphs you will explore Design Thinking, design research and participatory action research as ways of arriving at practical innovations.

1.7.1 Design Thinking

In recent years, in the professional profiles within education, more attention has been paid to a design-oriented way of working. Within education and healthcare, the method of Design Thinking can be applied to solve tough issues (Van 't Veer et al., 2021). In traditional research methods, the analysis and better understanding of a problem is central (Van 't Veer et al., 2021). In the process of Design Thinking, you look for the desired improvement or innovation by using creative methods, considering an issue broadly and certainly also working from existing knowledge sources.

Designing an intervention is central to Design Thinking, which proceeds according to a number of steps. The first division is between (1) defining the problem and (2) providing a solution for the problem. These two steps form the basis in the 'Double Diamond Model' (figure 1.4), where broad observation (diverging) and focusing (converging) are the alternating movements in the two steps.

Figure 1.4
Het Double
Diamond Model



Source: Design Council (2007)

Defining the issue

In this first phase, you explore the issue from different perspectives. You learn to develop different perspectives for the issue using working hypotheses. The idea is to look at the issue from different angles. You do this by talking to clients, students and other actors with an interest in the issue. You use creative methods to explore these different sides of the story.

In this phase, you explore the potentially unruly environment. Who are the people, how do they act based on a mission and vision of the organisation and who is the organisation? Various actors are involved in an organisation and they always have 'their own' interests, so how much weight do these interests carry, what forces are at play and what powerful metaphor characterises the organisation or the client for whom you are going to explore and solve this issue?

A third layer in this phase is the collaboration within a team. What qualities do you have and what qualities do you use to let the team excel? And what roles would you like to practice within the team?

At the end of this first phase (converging) you will reach an insight in which you sketch a picture of the issue. A working hypothesis can be helpful here. This is an important step for determining the further design process.

Proposing a solution to the issue

In the second step, the team works on a solution to the problem. The word 'propose' was chosen deliberately. Tough problems are characterised by a certain degree of uncertainty and intractability, so the question is whether a solution within the time for this component is a outcome.

The process starts with diverging, in which possible solutions (or scenarios) for the problem are suggested using various creative methods. Here too, interaction with the most important actors is essential. In addition, you are expected to consult existing knowledge sources about possible solutions. What is known about 'what works' in this situation and that fits the problem? Towards the end, the phase of proposing a solution comes into the picture (converging).

1.7.2 Design research

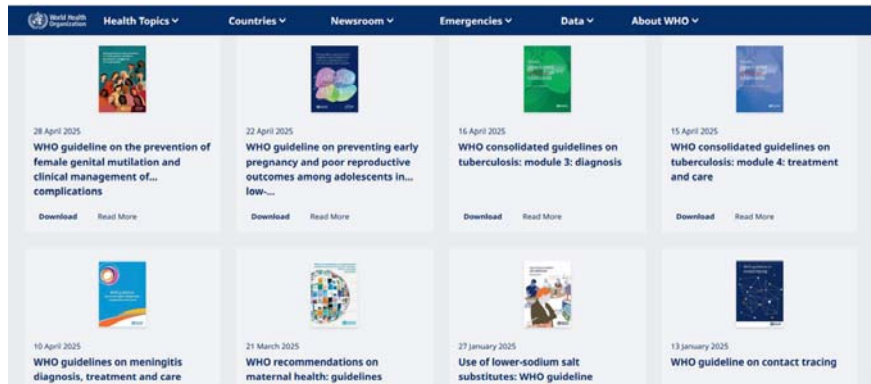
Design research is a research method that focuses on developing innovative solutions for complex social or practice-oriented problems. In contrast to traditional scientific research, where the emphasis is on analysing and explaining existing phenomena, design research aims to create new interventions that bring about valuable change in practice. In design research, you as a researcher (as the word suggests) come to a design for the organisation or the professionals. While researching, you

design the layout of a playground in the neighbourhood for older children, with the aim of preventing nuisance caused by various young people hanging about, or you design a guideline for, for example, healthcare professionals on how to combat various diseases.

In healthcare, for example, many guidelines on how to act have been written for professionals, on the basis of design research (see figure 1.5).

Figure 1.5

Sample guidelines based on design research



The core of design research is the iterative cycle of design, test and redesign. The researchers formulate a clear definition of the problem, set guiding research questions, brainstorm about solutions, build prototypes, evaluate them with users and adjust the designs until an optimal solution is achieved. An important aspect of design research is the involvement of the various users and stakeholders. Users, experts and other stakeholders are actively involved in the design process, so that their perspectives and needs become central. This results in designs that are more in line with reality and are more relevant to the target group.

1.7.3 Participatory action research

Participatory action research is also a suitable research strategy to arrive at a practical innovation and at the same time to improve. Participatory action research differs from design research in the pursuit of the actual effect of professionals in an existing professional practice. In conducting research together with stakeholders in a cyclical, iterative manner, the two forms of research correspond to each other.

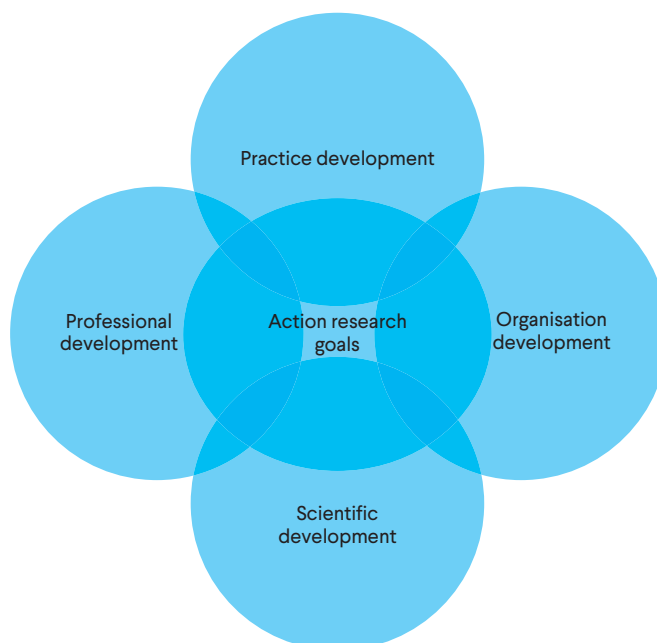
Goals of participatory action research

In participatory action research, four worlds come together (see figure 1.6). These worlds are the goals that participatory action research focuses on. Participatory action research is focused on improving and changing existing practices (practice development). That can be seen in the example of the

attention given to exercise for young people in the hospital. The young people can exercise daily and that in turn has a positive effect on their health. Introducing attention for the exercise guideline and daily exercise can ensure that the professionals in the hospital pay more attention to it. If the organisation (the hospital) adopts the exercise book and develops it further and makes it more central to the policy, then we speak of organisational development. If the hospital then monitors the effects of this exercise and investigates whether this potentially leads to other positive health effects for the patient, then it becomes a scientific development.

Figure 1.6

Model of the four worlds of action research



Source: Van Lieshout, et al. (2021)

These goals of action research (Van Lieshout, et al., 2021) require continuous interaction with important actors and stakeholders. This can be done by approaching them as a source for the data to be collected (as a respondent) and they may be or will become co-researchers of the pedagogical issue. Action research by definition requires participation, but the degree of participation of the stakeholders can vary.

Participation

Participatory action research is characterised by professionals conducting research together with the researcher, which is aimed at both the change and the development of knowledge about the change (Van Lieshout, et al., 2021, p. 3). The advantage of participatory action research is that participants work 'together' on possible solutions and increasing

knowledge. Action research is characterised by a number of principles (Van Lieshout, et al., 2021). The most important are:

- 1 It is a cyclical structure: participatory action research is characterised by an iterative process of different process steps (which can overlap).
- 2 It is a participatory process, in which different actors are involved in the different steps of the intervention cycle.
- 3 The research is person oriented.
- 4 It requires a reflexive attitude on the part of the researcher.

1.7.4 Similarities and differences

The Design Thinking method is more solution-oriented and the methods use various creative forms to arrive at, or contribute to, a practical innovation. Design research and participatory action research focus more on going through a number of steps, using more scientific methods to arrive at a contribution to a practical innovation. Both methods are characterised by cyclical working and attention to consulting the various actors. Design research focuses on 'designing'. Participatory action research goes a step further and implements devised interventions in practice, implements them and then evaluates them, after which the interventions are adjusted if possible to start the next cycle. In principle, in participatory action research, the actors are also used as co-researchers at various points in the research, partly with the aim of stimulating effect.

Assignment 1.7

Find a news article for a study that has brought about a practical innovation. Which of the above strategies did the researchers use in that study? What are the arguments for this?

1.8 Action plan, research proposal

The purpose of this first chapter is to prepare you for writing an action plan for your research. This action plan is also called a research proposal. In this action plan, you describe the reason for the research, the problem definition, the objective and question of the research and your research design. These components are discussed in the first five chapters. It is important to be aware – also in conversations with potential clients – of what their approach is (explore, explain, change) and what research strategy is suitable for this. The strategies (Design Thinking, design research, participatory action research) that focus on changing existing practical situations require from clients (and their professionals) that they share their thoughts and make decisions on the steps in the research more than research that is only focused on collecting information to explore the issue.

An action plan usually consists of several elements:

- the reason, the problem definition
- the purpose and questioning
- an exploration of the theory on the subject
- the choice of research strategy
- an elaboration of the sub-questions and the suitable methods
- the choice of a population or a sample
- the way in which the research meets quality requirements of usability, reliability, validity and ethical conduct

An elaboration of the elements of an action plan for your research can be found in the following four chapters.

Assignment 1.8

Have an initial conversation with your clients about the topic of the research and what ideas they have about the research you are going to conduct. Which elements of this first chapter do you see reflected in the conversation?

Assignment 1.9

What direction do you think the research will take in terms of exploration, explanation or change? Will it become more quantitative or qualitative in nature?

Assignment 1.10

Are you expected to deliver a professional product and which approach is most appropriate for you?

Assignment 1.11

Check what requirements your study programme sets for the action plan or the research proposal. What expectations do they have about the direction and strategy of your research?

Summary

- There is a difference between searching, finding out and researching. In research you systematically collect data based on a research question.
- There are different types of research goals. We distinguish between exploring, explaining and changing. This starting point determines how designs, methods and analyses are shaped during your research process.
- A basic distinction that you can make is the difference between quantitative and qualitative research. In quantitative research, you collect data and the data consists of numbers. You often collect the numbers by either handing out questionnaires or observation. In qualitative research, you collect the stories from respondents. You do this mainly through various forms of interviews and possibly through observation.
- Non-scientific reasoning can be recognised by a number of aspects, including irrefutable statements and anecdotes as evidence. Scientific research always involves assuming a certain degree of uncertainty and provides for refutable statements.
- There is a difference between 'Evidence Based Practice' and 'Practice Based Evidence', where 'Evidence Based Practice' is more based on scientific evidence about effectiveness and efficacy than 'Practice Based Evidence'. In 'Practice Based Evidence', the insights of the professional also play an important role, because there is no scientific evidence yet for the effectiveness of an intervention.
- Within higher education, more attention is being paid to the effect of research that focuses on questions taken from practice.
- When arriving at a practical innovation, as a researcher you work more from a goal aimed at changing or improving an existing situation. There are various research designs that are well suited to this, such as: Design Thinking, design-oriented research and participatory action research.

- Before you start your research, you usually write an action plan. This action plan consists of various interrelated components and a substantiated plan about the reason, the research questions, the chosen design and the methods to be used.