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NEL VERHOEVEN

DOING RESEARCH

The Hows and Whys of Applied Research

5TH EDITION

+ WEBSITE

For Jan Willem, Sharon and Sander

Doing Research
The Hows and Whys of Applied Research

Nel Verhoeven

Fifth edition

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+website!

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Foreword

Subjects such as research methods and statistics are not the most popular among students. Often they dread these courses: they are afraid that they won't understand the subject matter, let alone be able to apply it. They tremble at the very thought of using formulas, and in their opinion they will never (again) have to put research into practice. When I wrote the first edition of *Doing Research*, I tried to lower this threshold to carrying out research and getting to know stats. From the numerous reactions I received I could tell that I had succeeded in my intentions.

The fifth edition

The fifth edition of *Doing Research* has been laid out differently. The reasons for this are the changing landscape within higher education, the personal and interactive approach to research education and the changing exit qualifications for graduates. Whereas fifteen years ago the emphasis was on having as many research skills as possible, and producing what to all intents and purposes is an academic graduation thesis, nowadays the emphasis is much more on acquiring skills and producing a professional product. Research skills still come in handy in this respect. In fact, they are indispensable if the student is to produce a good professional product. That said, the role and place of research skills are evolving to become an instrument for addressing questions in practice. This is a great place to have in tertiary education, if you ask me. And it's the right place too. It means having a different range of research skills, and for that the book needed a new layout, one with many short chapters. Unlike previous editions, each chapter deals with one subject only. The four phases of applied research are still the guiding principle.

For the rest, much attention has been paid to case studies in this edition. Apart from many new examples, the associated website has been changed.

New tools are available in this edition, both on the website and in the book. For example, *checkpoints* are included in the chapters; these are short knowledge questions that students can use to test whether they have understood the text correctly. The book also contains *procedure guides,* which help to stick to the right order and make choices while designing and carrying out research.

The new edition of *Doing Research* is even easier to navigate, and is hands-on, with lots of infographics and visuals, and short, inspiring texts.

The book is suitable as an introduction to research methods, but also as a reference work during internships and graduation projects.

Many thanks

Many people were involved in the compiling of all editions of this book. When I wrote the first edition, Bob Bouhuijs of Windesheim Christian University, Annete Bogstra of University College Utrecht and Jan van Leeuwen of Fontys University Eindhoven all gave me advice. Jan Willem Zeijseink advised me on Chapter 6 and Rika Verhoef did the same for parts of Chapter 7. For the more recent editions, Peter Swanborn, Siep van der Werf of the University of Applied Sciences Amsterdam, and Anya Luscombe all went through the text meticulously and put forward their suggestions for changes. For the fourth edition, Mirca Groenen gave detailed editorial comments and went through the words for the index register with a fine-toothed comb. For the fifth edition, Desiree Joosten-ten Brinke was helpful with advice about peer feedback. I am very grateful to Lineke Oppentocht and Mieke van Dalen for the critical opinions they gave me while I was writing the fifth edition. As a result, I have looked at my texts with different eyes.

Many teachers took the trouble to complete a questionnaire about the book and to provide me with their useful suggestions. Finally, I would like to thank Esther den Hollander, Astrid van der Schee, Elsbeth Bouman and Gerdi Smit for their quick and useful advice and of course for their unflagging support during the writing process.

The field of 'research methodology' is evolving continuously; teaching this subject and developing material for lessons are too. Which is why I am always keen to receive your comments and suggestions via www.nelverhoeven.nl.

Happy reading!

Nel Verhoeven
Ovezande, January 2019

Contents

Instructions for using the book and website

*Read these instructions for use **before** you carry on reading this book or looking at the website. Then you'll know straight away what a good **method of working** is, how **the method** is structured, the help that the **procedure guide** in the book has to offer, what the **recurring components** are in the book and what exactly you can find on the **website**.*

Is research new to you? How are you going to tackle it then?

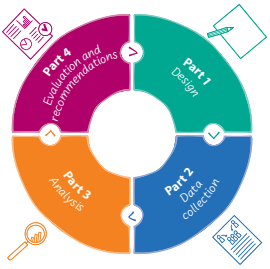
You get the most out of this book and the website that goes with it, by doing the following in each **chapter**:

1. Read through the learning objectives in the book;
2. Read through the whole chapter in the book;
3. Look at the answers to the questions on the website under in the 'check-points';
4. Do the extra assignments on the website;
5. Check whether you have mastered the material properly by going through the learning objectives again.

If you have finished all chapters of a **part**, you go to that part on the website. You can then do the following:

6. Do the knowledge test;
7. Practice the concepts with the key concepts trainer;
8. Check out the research tools and the in-depth material.

Method structure



The research procedure can be divided into **research phases** *Doing Research* is based on four phases:

1. Design
2. Data collection
3. Analysis
4. Evaluation and recommendations

That is why this method comprises four sections. Each section deals with those topics that are important in the research phase being discussed. In total there are twenty chapters divided into these four parts. At the beginning of each chapter, you will find **learning objectives**.

Procedure guide

To help you find your way through the various stages of research, you can use the **procedure guide** in the book:

- Procedure guide Part 1: p. 16
- Procedure guide Part 2: p. 114
- Procedure guide Part 3: p. 234
- Procedure guide Part 4: p. 318

The chapters of that part are mentioned in the procedure guide. For each chapter, you will find an overview of the most important steps that are discussed in that chapter. At the end of each chapter, we show you a piece from the procedure guide, namely the chapter that you've just been through. This way you always know exactly where you are in the process of doing research.

Recurring components

In each chapter of the book you will come across several set elements:

Examples	**Of the research design, analyses, results, conclusions, for instance**
Checkpoints	**Knowledge questions concerning the dealt with subjects**
Key concepts	**Most important concepts and their meaning**
Overviews	**For instance, tips, checklists, characteristics of research methods**

Example 1.13 Food bank

What experiences do volunteers and customers have of the handing out of food at the food bank? One hundred and thirty volunteers and customers at the Utrecht Food bank were given a written questionnaire. Of these, 39 were completed and returned. That is a response rate of 30%. Are the results usable? Yes! Statistical generalization is not an absolute must. For the food bank, the results are very valuable because with Utrecht Food Bank can use them to improve the system they have in place for handing out food.

Checkpoint 5.1

Underline the following central questions in the concept-as-intended.
- What is the situation concerning burnout among Dutch people?
- Which factors influence Dutch buying patterns?
- What role does Twitter play in influencing voting behavior?

Key concepts

Central question	The central question that you aim to answer with your research.
Objective	The objective, the function of the research, for the researcher and organization or client

Six main features of case studies
- N=1 research;
- intensive/extensive and interpretative;
- the central question has to be suitable for a case study;
- natural environment;
- various data collection methods;
- interacting with the respondent(s).

The book as a reference work

Are you familiar with research? For instance, because you are at the end of your study and you will be graduating, or because you work as a researcher? Then you can use *Doing Research* as a reference work. The index at the back of the book lists the most important terms used. You can also consult the process guide for each section and chapter so that you consult the right information at the right time during your research.

Website

You need the book's website so that you understand and process the material properly. You can access the website doingresearch5thedition.com using the unique activation code on page 4 of this book.

The website is structured in the same way as the book: in four parts. Each part covers the following aspects:

Answers – to the questions in the checkpoints

Extra assignments – questions with feedback so that you can check your progress

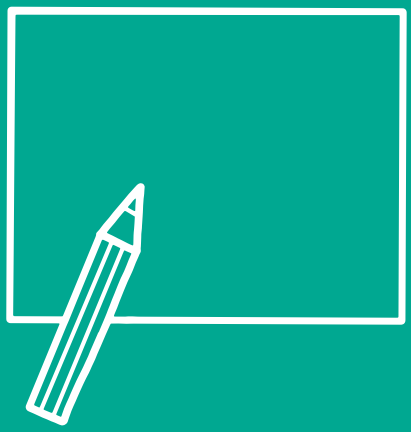
Knowledge test – a test per part with a final score

Concepts trainer – to test your knowledge per section on all key concepts and many other concepts discussed in the book

Research tools – overviews, templates and checklists that you can use in the various research phases

In-depth material – information on several topics if you want to know more about them, for instance, on statistics topics

Part 1
Design



Procedure guide

2 ***Choosing the subject***
Choose the subject
Conduct the intake interview
Discuss expectations with supervisor and client

3 ***The background to your research***
Formulate the background (reason)
Search for background information
Set up logbook

4 ***Central question and objective***
Formulate the central question and objective
Formulate sub-questions

5 ***Concept demarcation and model building***
Demarcate definitions
Design the theoretical framework
Model the assumptions about the results
Formulate assumptions about the results

6 ***Research proposal***
Write and present the research proposal
Draw up a schedule
Process feedback

Part 1
Design

Part 1 of the *Doing Research* method is about the first phase of your research. This is the design phase. What does that actually entail, designing a research project? The answer is: all activities that lead to demarcating the research topic (the *domain*), i.e., formulating the central question and objective and any sub-questions that there may be. The contours of your research project become clearer in the design phase. This phase not only clarifies the domain, the questions and statements about that domain become clear too. Apart from that, you answer the following questions:

- What information do I need?
- Where should I look for that information?
- How do I get that information?
- What am I researching?
- With what objective in mind am I going to do the research?
- How am I going to research it?
- When am I going to research it?
- Who am I going to research?
- Which agreements will I reach about the final products that I have to deliver? About the procedure and the communication? About the deadlines?

All important topics for this first research phase are discussed in six chapters.

Chapter 1 is an introduction. You learn what research is, what you need it for, what the basic principles of research (methodology) are, and what characteristics a good researcher and good research have. The chapter also discusses the four research phases.

Chapter 2 deals extensively with the contacts with the client, and selecting and determining a subject.

Chapter 3 is about the background to your research and what you have to do to prepare this background: a bit of preliminary research. Here you will be given a handy tool to help you write the background: the 6W method. In that preliminary research, you will look for information about the subject you have chosen. In this chapter you will get information about the options you have to make your search easier, and you will learn how to use a logbook as an aid in your research.

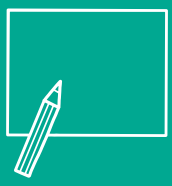
In Chapter 4 you will learn how to formulate a central question and objective, and what conditions they must meet. Here, we will also discuss why asking sub-questions can be useful, how many sub-questions you can ask and what the criteria for them are.

Chapter 5 is the chapter that discusses demarcation, the theory and model building. You will be taught how to demarcate the subject of your project, how to define the most important concepts and – again – how you can use preliminary research for this. You do this preliminary research to gather information about previous research results, and to look for theoretical principles. You will be taught how best to go about designing a research model. You are introduced to the search procedure to find theoretical or model-based principles that you can use. You then put together the theoretical chapter.

Chapter 6 is about your research proposal. The conditions that proposals must meet vary according to the type of study. This chapter gives you a general overview of the various components that constitute a research proposal for most studies.

If you go back a page, you will see the procedure guide for Part 1 of your research: the design. This way you can see at which points in time during your research certain parts are dealt with, and where you have to make important decisions. At the end of each chapter, we show you a piece from the procedure guide, namely the chapter that you've just been through.

1 Why do you do research?



After going through this chapter, you will know:

- *why it is useful to learn more about research (introduction);*
- *what the basic principles of research (methodology) are (1.1);*
- *what the characteristics of a critical researcher are (1.2);*
- *the quality requirements your research must meet (1.2);*
- *which practical requirements your research must meet (1.2);*
- *what the various phases in a research project are (1.3);*
- *what role a professional product plays in your research (1.4).*

Why this method?

During your study, you will regularly have to submit a research report and/or professional product. But how do you do research? And how do you compile a research report or professional product? This method teaches you how to set up, carry out and assess your own research. It teaches you how to give a reliable answer to a good research question. For that, you need knowledge, skills and a certain attitude. This method tells you all about that. Finally, you will learn how you can report on your research, and part the professional product plays in this.

Doing research

Doing research is the analyzing of a problem or a situation according to a specific phased plan. You do it using tools that have been developed for this. By approaching the situation or problem in this way, you can answer questions and solve problems.

Working according to a phased plan is a *systematic approach*. The tools you use here can be compared with tools in a toolbox. Everything that you need is in that toolbox. All you have to do is unpack it. Needless to say, you have to have the right tools.

Why do you do research?

You do research to answer questions or to tackle problems. It makes no difference whether at a later stage you teach at a primary school or work at an architecture firm, or whether you get a job in engineering or commercial economics. Wherever you are, there will be questions and problems that require an answer, an answer that is best found by working according to a systematic approach.

You will be able to provide an answer to these questions in your professional field using the research skills that this method discusses.

Research doesn't necessarily have to solve a problem, and a problem is definitely not always negative. Research may be used to take stock of things, if it gives a clear overview of how things are organized. Then research is suitable for research questions like: 'How does ... work?' Or 'What are the characteristics of ...?' You may not always get an answer to your question straight away. But the research may still be good. Bear in mind that 'doing research properly' doesn't necessarily mean that you can get the right answer; it means that you can ask the right questions! In short: *learn to be inquisitive!*

Research is like a journey

Think of research as a journey. Along the way – from the start of your journey until the end (your report/professional product) – you will come across several forks, crossroads and side roads. These represent the choices you'll have to make during your research project.

You start with an idea for a project, or you have a question from your professional field. You elaborate this idea or question in greater detail, you look for sources, you formulate the key question for your research and you make a plan. You develop certain expectations about the results. You then start collecting and processing information. You supervise the project throughout, and keep an eye on the quality. Then you evaluate it, and finally you report on the results and present your recommendations.

When you're on a journey, you make similar choices. First you choose your destination. Then you find out about the best way to travel, and you make a plan. You plan your whole trip based on your expectations, with an expected arrival time and a few stopovers along the way. You gather your information about departure times, hotels, travel times and so on. During the journey you

keep checking whether you're still on the right route, whether you're on time and whether all the various parts of your travel plan are still on track. At the end of your journey, you will know whether your plan was a good one. You look back (evaluation) and you look forward (recommendations). You also assess the quality of your journey. What went well, and what would you do differently or better next time?

A research journey is not one-way traffic. You don't only assess your own research process. You also share your experiences with peers (fellow travellers); by studying one another's methods, you learn from one another.

You get tools from your 'tool kit'

During your research project, you use a 'tool kit' with tools: assumptions, instruments and instructions. These tools will help you to conduct your research properly. They are the foundation for your project. Without a toolbox with good tools in it, your research may fail.
Let's go back to the analogy of research as a journey. The tools in the toolbox would be your travel plan or the timetable. They guide you and give you something to go by. They make sure that you make the right choices at the right time. Because just setting off on a journey (research project) is asking for trouble.

Research in steps

Maybe you don't realize it, but if you have a problem or a question, you often use research techniques to find the answer. Have a look at Example 1.1:

Example 1.1 The queue at the box office

A famous pop group is coming to town. They're playing at Madison Square Garden. You and your friends go down to the box office to buy tickets. The queue is around the block! What if the tickets are sold out! You look at the queue and the number of people waiting at the box office. You take the shortest queue.

- Your question is: how can you get to the ticket office in the shortest possible time?
- To answer your question, you observe the queues. Then you count the number of people waiting.
- You conclude that the waiting time will be shortest in the shortest queue.
- You go to the queue with the fewest people.

In the *Doing Research* method, you gain experience by applying the logical sequence of each research project. You learn which steps you need to take for each research project. The steps are the same everywhere: whether you are trying to predict the waiting time at a box office, or you are trying to design a complicated research project about the causes of a certain disease.

Simple or complex

The example about the queue at the box office is simple. But if you're doing research for a client, there's much more to it than that. Your research design is generally much broader. Many people may be involved in the research project, you will be conducting extensive and complicated analyses, you will be writing a detailed research report, and you will be presenting it to the client. Also, quite often you have to make recommendations, or present a design, a plan or measures. That said, whether research projects are complicated or simple, they follow the same pattern.

If you want to learn how to do research, you have to do more than merely acquire knowledge from a book. A book can teach you how to set up a plan, design a research project or define a central question. You can also learn how to carry out an analysis and how you compile a report and account for the findings. But when you *conduct* research, you have to be able to combine the knowledge and skills that you've acquired; you have to develop a kind of helicopter view of your research. Doing research has much more to do with skill than with knowledge. In brief, you have to get experience. You learn research by doing it.

Informal or systematic

Is anyone who makes a casual observation automatically a proper researcher? No, not quite. When it comes to *informal observations*, i.e., in daily life, if you are not really planning to conduct research, you may use your own frame of reference to draw your conclusions. That means that you subconsciously assume that other people do the same as you, as Example 1.2 shows. Real researchers don't do that. They use *systematic observation*. In other words, they base their observation on a phased plan, without having preconceived ideas about the outcome.

Example 1.2 Reflections on a vacation

The weather is great, it's the end of August and you're on vacation. You're visiting London and it seems like an excellent day for a boat trip on the Thames. Once on the boat you see a group of young Oriental people. Complete with cameras and strange shoes, they're jabbering in what sounds like Japanese, but then it would, wouldn't it? Must be Japanese tourists, you think to yourself.

Are they really?

What you're looking at is a group of first year students who have come to study at the London School of Economics. It's their introduction week.

Because you yourself are on vacation, you automatically assume that the young Japanese people are too. You use your own frame of reference to draw your conclusions.

1.1 Research approaches

Practical considerations
You don't do research in a vacuum. First you draft a research plan; you define the central question; you check whether anyone else has researched the problem and what their conclusion was; you set a deadline and you draw up a budget to see what is necessary (and available) for carrying out the study; you consult your supervisor, your client, and your co-researchers. These are the practical aspects of research.

Markers
Besides these practical aspects, there are other, underlying approaches that can be used to classify research. This is known as *methodology*. Based on these approaches, you can describe your research in various ways; they are the *markers* of the research. For instance, there's a difference between *fundamental* and *applied* research, between *qualitative* and *quantitative* research and between *induction* and *deduction*. These are described in the following sections.

The *Doing Research* method is mainly about designing and conducting applied research, but it is also important to know something about the theory underlying it. Knowing about these basic research norms is crucial for a good understanding of the function of research.

1.1.1 Fundamental or applied research?

In principle, and according to the science of methodology, there are two main types of research: *fundamental* (empirical) research and *applied* research. University students are more often than not confronted with fundamental research, like the research in Example 1.3. College students, on the other hand, mainly carry out.

The main difference between these two approaches is the type of problem to be solved. The questions raised in fundamental research generally answer questions that aim at developing knowledge. So they are *theoretical questions*. Applied research, however, is all about solving problems that have a practical application, i.e., *practical questions*. Sometimes the theoretical question that is answered turns out to be a good solution for a practical problem. In that case fundamental research is also applied research.

Example 1.3 Smoking addiction and the brain

Nicotine is one of the most addictive substances around. Neurobiologist, Taco de Vries, does research into this kind of addiction, in particular into how the brain reacts to nicotine. He does this by first establishing what nerve cells in the front of the brain (the prefrontal cortex) are involved in nicotine addiction. With that information, he can ascertain in two ways whether nicotine addiction can be tackled: with medicine to combat a relapse after stopping and with behavioral intervention, i.e., intervening to solve a problem. Taco wants to investigate the effect of these two methods on smoking addiction.

Source: www.zonmw.nl

The following section explores the difference between theoretical and practical questions.

1.1.2 Theoretical or practical questions?

A theoretical question is a question that you answer using fundamental research and that provides knowledge in the research. A *practical question* is normally one that arises in daily life, from society. The answer provides tools that you can use to solve practical problems. Applied research, therefore, is especially important for society (externally oriented) and fundamental research is important for science, for the research itself (more internally oriented, see Smaling, 2006).

Of course, it may well be that fundamental research tests a theory that can also help to solve a social problem. For instance, fundamental research into the shifting of sandbanks in coastal areas may well have social relevance if it leads to better protection against floods. So the difference is not very clear: knowledge questions can also be answered in applied research, and practical questions are also investigated in fundamental research.
Example 1.3 outlines a fundamental research project. The question in this research is a fundamental one. The researcher wants to test the functioning of the brain in those who are addicted to smoking. The question also has an applied aspect to it, because the knowledge gained from this research may improve ways to tackle addiction.
Example 1.4 shows two reasons for doing applied research. This is a topic that originates in society (Highlands Sports Club). The aim is to improve the organizing of a running event.

Example 1.4 Highlands Sports Club (1)

For many years, Highlands Sports Club has held an international cross-country event. Cross country involves running, not only on the roads, tracks and paths, but also across fields and streams. The distances and the age categories vary. Every year, lots of volunteers are involved in the event, and the race is broadcast on television. At the annual evaluation meeting that follows, the question is always raised about what the participants, staff and spectators thought of the race. The board wants to see the answer in figures. The board also wants to know exactly what the target group is for the competition in terms of age groups. This will allow them to keep the sponsors happy and perhaps even attract new sponsors. Not only that, the results of this evaluation can be used to improve the organizational aspects of the event. Research into the levels of satisfaction among the three groups of people is carried out.

Key concepts

Theoretical question	A question to which the answers provide knowledge about a subject (fundamental research).
Practical question	A question to which the answers lead to the solution to a practical problem (applied research).

1.1.3 Qualitative or quantitative?

Another distinguishing factor is that between *qualitative* and *quantitative* research. There is an important distinction between the two when it comes to choosing the research method you are going to use. That choice depends on the central question of your research. That question decides whether you will opt for qualitative or quantitative research.

The *quantitative* method is based on *numerical* information, i.e., figures that represent objects, organizations and people. As researcher you assign a number to this data: age in years, value from '1' to '5', gender in '1' (male) and '2' (female). With this number, this value, you can make an objective measurement. You use statistical techniques to process the attributes and to test assumptions about the results. Statistical techniques are the tools used in quantitative methods, like the method used on Example 1.5.

Example 1.5 Highlands Sports Club (2)

A research plan is drawn up to assess the level of satisfaction among the cross-country participants (i.e., the athletes). To gather the information, they decide to carry out a survey in which about 20% of the 2,500 athletes will be interviewed. They will assess levels of satisfaction for a number of aspects (in other words 'parts') by 'rating' them. The background characteristics of the athletes themselves will also be recorded (gender, age etc.). Their responses will be analyzed numerically (quantitatively), by comparing the various ratings. Differences between the ratings will be compared according the various groups as well, i.e., young versus old, men versus women and so on.

Some researchers favor *quantitative* methods because they prefer to rely on numbers: figures lend them a feeling of security in the sense that they feel quantitative research is 'more accurate' than qualitative research.

When *qualitative* methods are used, the researcher carries out research in the *field*, i.e., in reality. He or she is mainly interested in the meaning that a person attaches to a situation or experience. The research subjects, i.e., the people being researched, are studied in their environment as a *whole*. This is also known as *holism*. This means that the experience is seen as a part of the person's perception of their lives, and not as a separate, independent entity. This means that it is *interpretative* in nature.
When you gather information for qualitative research, the methods you use are open and flexible, and you can intervene when the unexpected happens. The information is not recorded in numbers, but in every day language (Maso & Smaling, 1998). In this approach, language is the tool of qualitative research methods (see Example 1.6).

Example 1.6 Guest experience

Recreational attractions and parks are often evaluated qualitatively. During a short interview, guests can be asked what they found to be the most striking, fun, irritating or boring part of their experience. These days, researchers often use tablets for this. Guests are asked to write down a few sentences about what they thought of the park or attraction. The information is then analyzed qualitatively.

Some researchers view qualitative research results as less reliable than those based on quantitative research. Other researchers believe that figures do not offer enough insight into the issues at hand because the figures cannot reveal the information underlying them. Qualitative researchers make a case for methods that not only focus on the figures, but also listen to what the people have to say (Wester, 1991). The parliamentary committee of inquiry method is an example of this.

Example 1.7 Parliamentary committee of inquiry

Imagine that you want to investigate whether there is any difference between non-verbal aggression shown by children aged 6 and those aged 10 when they're playing. You may decide to observe the behavior of children in Grade 2 and those in Grade 5 during break time, on two consecutive days. You make a note of what you see on an observation form and then you compare what you have noted. This is qualitative research.
'Committee of Inquiry' is a misnomer, from the perspective of methodology at least, because investigations of this type are actually qualitative. They are open interviews involving a set number of people and experts, whereas if you conduct a normal survey you present the respondents with a fixed set of questions.

Key concepts

Qualitative research	Research not based on numerical information.
Quantitative research	Research based on numerical information.

In *Doing Research* you learn about qualitative *and* quantitative methods because they are both used. Obviously, the difference between these methods is in the way in which you conduct the research, but also in the way you look at research. The emphasis in qualitative research is on the meaning that respondents give to a situation based on their own background, say the respondent's *context* (and the researcher, more on this in Chapter 16). In quantitative research the emphasis is on making phenomena measurable and on generalization, i.e., objectively measuring characteristics and drawing a valid, general conclusion. The corresponding context is not measured. Qualitative research often involves collecting a lot of information about a few people, while quantitative research is not so much (or at least less) about information, but about a large group of people instead.

In a diagram, this looks more or less like this:

	Qualitative	Quantitative
Emphasis on meaning/context	Yes	No
Number of respondents	Few	Many
Data per respondent	A lot	Not much
Type of information	In-depth	Superficial
Objectively measurable (numerical)	No	Yes
Statistically generalizable	No	Possibly

Table 1.1 The characteristics of qualitative and quantitative methods

Yet these two methods are not in opposition; instead they can supplement each other very well so that a comprehensive answer to the problem is given (see Doorewaard, Kil & Van de Ven, 2015). It's not that clear cut.

Triangulation and the mixed method approach

If you want to approach a central question from various perspectives, then you can use various methods to collect information, i.e., data. This is called *triangulation;* this literally means 'triangular measuring'. Example 1.8 shows you how this works in practice.

Example 1.8 Timber frame construction

An engineering student carried out graduation research with a construction company that uses timber frame constructions in its construction. He investigated how this company could guarantee the quality of its product. Besides demarcating the quality criteria, the student also investigated the state of affairs regarding quality control and quality assurance at the company. He also gave them recommendations so that the company could guarantee the quality of its construction products. He conducted the research using various methods for each sub-question, such as researching source material, observations and interviews.

Source: Geulleaume, 2016

Triangulation is used to enhance the quality of research, i.e., its reliability.
A special kind of triangulation is the *mixed method approach* (De Boer, 2016). In this method, you choose a combination of (specifically) qualitative and quantitative data collection methods to answer your question. So the methods that you use must include both qualitative and quantitative elements. Companies and organizations are no longer only interested in the bare figures, they also want to know what the background to these figures is. That is a good reason to opt for a qualitative method alongside a quantitative method. That way you shed light on the problem from several points of view. It enhances the validity of the research results.

Key concepts

Triangulation	Tackling the central question using various research methods.
Mixed method approach	Research that uses qualitative and quantitative methods.

1.1.4 Inductive or deductive?

When you do *inductive* research, the theory is not known in advance. The researcher's objective, therefore, is to develop the theory as he or she goes along. In formal terms, the researcher is looking for 'empirical regularities' (Tijmstra & Boeije, 2011, p. 32). This means that he or she makes statements based on the observations, i.e., the information.

Researchers who use inductive methods often (but not always) use qualitative research in which they work from the 'particular' (the information collected) to the 'general' (the theory to be developed). So inductive research is about developing a theory (see Example 1.9). *Iteration* (repetition) is a guiding principle in this because it leads to a higher standard of results. This is the process that the researcher follows: he or she gathers and analyzes the information and draws the first conclusions. This establishes the kind of additional information that is required. The researcher then goes on to gather and analyze new information. In other words, he or she is using an iterative process. Each time the researcher links the results to the results obtained previously and so a theory is formed. More about this in Chapter 6.

Example 1.9 Social media

Suppose you are researching social media usage among students at a college in Michigan. You collect information using interviews, you analyze the information and you discover that a degree of self-motivation arises. You go on to collect additional information about self-motivation, you analyze the information once again and you draw conclusions about the students' attitudes to work. With these conclusions, you present a model for the digitizing students' attitude to work.

The opposite of inductive research is *deductive* research. In deductive research, the researcher formulates assumptions on the basis of (existing) theories and models. The researcher gathers and analyses information to assess whether the theories hold water. In simply terms this means that you assess whether your model (theory) is valid (is true) for the information that you have collected. This principle is often used in quantitative research where the process goes from 'general' (the theory) to 'specific' (the information). Deductive research is therefore *theory-testing*.
So, in effect, induction and deduction complement each other: you develop a theory inductively, and then you use deduction to check whether the theory is true (see Example 1.10).

Example 1.10 Bloom's taxonomy

Bloom's revised taxonomy (Anderson, Krahwohl & Meyer, 2001), for instance, describes various cognitive competency levels. Based on this theory, you develop assumptions about the cognitive competency levels when deploying social media in tertiary education. What you are actually doing is applying a theory to a new subject. You gather information and analyze it to see whether the theory holds for your subject.

Now, you may be under the impression that researchers who use inductive research don't have any expectations. That is not entirely true. Based on their knowledge and expertise, researchers have certain expectations about their research findings, but in inductive research these expectations are not based on a model or theory, whereas they are in deductive research. Thyme and Boeije (2011) call this an *exploratory hypothesis*. You test an exploratory hypothesis using a qualitative method.

Key concepts

Inductive research	Theory-developing research.
Deductive research	Theory-testing research.

Checkpoint 1.1

- Which methods of data collection were used in the examples for the research:
  a. into nicotine addiction (Example 1.3)?
  b. at the Highlands Sports Club (Example 1.4 and 1.5)?
  c. into guest experience (Example 1.6)?
  d. in the parliamentary enquiry (Example 1.7)?
  e. into the customer buying patterns at the gardening center (below, Example 1.11)?
- Suppose you do research into student satisfaction at your college. You conduct interviews with students and lecturers, you design a survey and the analyze findings from previous research into student satisfaction. Which approach have you chosen to answer your central question?

1.2 Rules for the quality of research

There are rules (criteria) for the quality of research that all researchers stick to – regardless of whether they are doing applied or fundamental research. That is what this section is about. Chapter 9 will discuss these rules in detail.

First and foremost, there are rules about the researcher him- or herself. This section starts with that. Secondly, there are quality criteria for conducting research

and interpreting the results. In applied research, it is called methodological soundness (Andriessen & Butter, 2016). Some methodological rules apply more to quantitative research, while other criteria are applied in qualitative research. This will be indicated in the explanation of the various rules. Finally, there are practical criteria, such as, the feasibility, efficiency and usability of the research.

1.2.1 Characteristics of a critical researcher

Researchers differ from those who are not researchers in three respects: their attitude, knowledge and skill.

Attitude

A (critical) researcher can be distinguished by his or her attitude. That attitude must be *objective*. That is to say that the personal preferences of the researcher must not influence the research. Your own personal opinion of the situation is not what it's about. This kind of *objectivity* is not always possible. After all, researchers are people too, with their own views and opinions. This may be a problem in qualitative research in particular, because these researchers are often involved with the people or groups they are researching.

That is why it is important that you as a researcher strive for *openness* in your research, that you are open to comments from your peers, and that you are accountable for your findings. This attitude is important in fundamental and scientific research. If your research findings are contradicted by other research, it's not because your research was inferior, it's because the findings were *refuted*. This means that your research may be the first in a series of thorough analyses. The research is ongoing, evolving. This *scientific attitude* is important because it will reinforce your research findings.
In Section 1.2.2 on 'falsifiability of statements' you can find out more about the openness of research.

Are you doing applied research? Then having a research-oriented and *critical attitude* is also important. You learn to look at your own research critically, from a 'distance'. You also learn to not just accept other people's research as true, but to examine it critically. This critical, research-oriented attitude may stand you in good stead later on in your profession. It could be, for instance, that certain measures may benefit the management of an organization, so that the organization is distracted from the true problems. This may not necessarily be the result of conscious decisions; often organizations have no idea where the root of the real problem lies. *Independent* research can shed light on the real issues, ensure that good solutions are developed to address them and that these solutions are effective. And that they are independent of the opinions and objectives of those concerned.

Knowledge

Obviously you can't apply research methods if you don't know what they are. *Knowledge* of methods is and always will be an important part of doing research. And you can't avoid this in *Doing Research* either. Knowledge about research methods, on the other hand, is consistent: you always need to know which research methods are out there, what criteria they use and what the pros and cons are of applying a particular one.

Alongside knowledge about methods, you will also need to know about the subject you intend to research. This is the kind of knowledge that you have to acquire or freshen up each time. You can look for information on the subject; you can read about it.

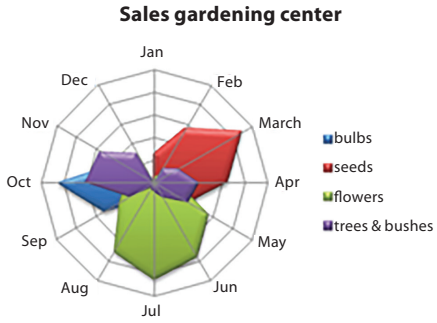
Skill

You polish the skills you need for research by actively going out and doing it. You become familiar with all the aspects of research, step by step, through examples and *cases*. Then you learn how to apply this knowledge. That knowledge is not only about the theory of doing research. It also contains a whole lot of 'recipes' that you can use when it comes to stats, software and so on. And about 'tricks' that you have to learn. For instance, how to select a research group, how to enter data into a software package, how to conduct a test, interpret analysis results, or create a diagram.

Example 1.11 shows you how you can use a diagram to show buying behavior.

Example 1.11 Radar diagram of a gardening center

A gardening center wants to gear its purchasing policy to suit customers' buying patterns. The buying behavior of certain products is analyzed for a whole year. This is what a diagram showing buying patterns looks like in Excel:



1.2.2 Quality criteria for carrying out and interpreting research

Below we discuss quality criteria for carrying out and interpreting research.

Reliability

Research is generally judged by the *reliability* of its results. The reliability of research has to do with the extent to which it is free of *random errors*. These are deviations in your research that are not verifiable, ones that are caused by unknown factors. Clients often use research results to make important decisions, or to determine policy. It must therefore be of good quality. Random errors in research can affect the reliability.

Research that another researcher carries out in the same way should lead to the similar results. So the research can be *replicated*. There should also be *agreement* among the researchers about the findings of the research. That is why it is important for the researcher to have an independent attitude (Section 1.2.1); he or she must view the research objectively, regardless of the results.

Reliability plays an important role in both qualitative and quantitative research, albeit in different ways. Chapter 9 discusses this criterion at length.

Falsifiability of statements

One objective of research is to get results about things that are observable in 'reality'. A subject, question or assertion must be *falsifiable*. This means that you can't make assertions like 'angels exist' or 'Manchester United is the best'. These are assertions that cannot be proven, that cannot be verified through testing. They are *speculative* (not based on facts) and subjective (it's your opinion). The point of research, quantitative research in particular, is to make assertions that can be tested.

The aim of research is to be *refutable*. This means that it should be possible to *confirm* or *refute* (reject) an idea or assumption. This has consequences for the way in which you formulate the subject, question or assumption of your research. There can be no confusion about the people or objects under discussion, about the time and place that are relevant to the research, or about the terms and concepts that you use to describe them. In short, the subject must be *unambiguous*.

It must also be *public*. A statement cannot be confirmed or refuted if you keep it to yourself and are not prepared to listen to feedback on the subject from others.

Making assertions in public means that they can be tested, that research based on the same design can be repeated in another situation. This means that research can be *replicated*. This *replicability* of research is therefore crucial when it comes to assessing the reliability of research.

The 'falsifiability of statements' criterion mainly applies to quantitative research.

Informativeness

The *information content* of your statements must be optimal. This is another aspect that is linked to the falsifiability of your assertions. To be able to verify a statement (i.e., for quantitative research: the verifiability criterion), it needs to be accurately formulated, you need to know what it is you are about to research, when and with whom. This is why it is important that you describe your subject *accurately* (Scheepers, Tobi & Boeije, 2016; Swanborn, 2010, pp. 243-244; Swanborn, 1987, pp. 35 et seq.). You have to be sure you indicate:

- the situation that you are referring to;
- the boundaries within which your research applies;
- the groups involved;
- the period that is relevant to your research;
- the 'domain' of your research, i.e., the whole 'area' that is relevant to your research, and all the elements that your research involves. The larger the domain, the more informative your statements will be.

The 'informativeness' criterion mainly applies to quantitative research, but it's popping up in qualitative research more and more these days.

Internal and construct validity

Validity has to do with the accuracy of the research results. Simply put: you need to be certain that the research doesn't have any *systematic errors*. These are errors that cannot be put down to coincidence. There are various kinds of validity (more on this subject in Chapter 9). If you are able to draw the correct conclusions from your results, then your research is *internally valid*.
Construct validity has to do with 'measuring what you want to measure'.

External validity

What would happen if we went about making statements about situations without researching them? What if we made rules without evaluating them? Imagine if the shops stocked things without finding out beforehand if they sell. What if people were given medicine without investigating what the effects might be and whether they are the right drugs for the sickness that ails them? Imagine if we went by what they have to say in the papers about certain groups of people, and dealt with these people harshly without investigating the facts of the matter first.
Researchers don't go about things in this way: they work differently. Based on their results, researchers want to be able to make assertions about as many

people or situations as they can. They analyze a specific part of 'reality' and make their statements based on that. If these statements have been verified accurately, and according to all the criteria for this, then they can be considered valid for a larger group or other situations: they are *generalizable*. This generalizability forms the *external validity* of the research, a special kind of validity.

There are roughly two kinds of external validity (see Example 1.12):

- By statistical generalization, we mean that statistical tests (quantitative) are used to assess whether results are generalizable or not. So it's technical.
- In qualitative research, researchers will try to get results that are comparable to results from similar situations, i.e., *theoretical generalization* (Scheepers et al., 2016, p. 268).

Example 1.12 Generalizability

Applied research may be carried out within one department of an organization, because that department has an issue that needs to be researched.
It is not necessary to apply the results to the whole organization, but they may be relevant to similar departments, even though the study was not conducted in those departments. The results are generalizable in terms of their content.
It may also involve applied research because the organization as a whole has issues that need to be researched. The sample for the survey is a randomly chosen and representative selection of staff, and the results are valid for the entire organization. They are statistically generalizable.

External validity is important to both qualitative and quantitative research, albeit in different ways.

Key concepts

Reliability	The extent to which the research is free of random errors.
Validity	The extent to which the research is free of systematic errors.

1.2.3 Practical criteria when conducting research

There are also several practical criteria that all types of research must meet.

Efficiency

Research must be *efficient*. This means that the costs should be in proportion with the results, and the schedule should be feasible.

Feasibility

In line with this, research must be feasible. You must have a big enough team of researchers, be able to approach your sample, collect and analyze data and report on time.

Usability

A general consideration that is particularly relevant to applied research is that it should be *usable* and relevant to practice (Andriessen & Butter, 2016). Many of the criteria mentioned are open to discussion, *usability* is not one of them. There is no point at all in doing research that has no practical application. No one needs research that goes straight into the dustbin. Example 1.13 describes an investigation at the Food Bank in Philadelphia. Despite the fact that only a third of the volunteers completed the questionnaire, the comments that volunteers gave are useful for the Food Bank.

Example 1.13 Food bank

What experiences do volunteers and customers have of the handing out of food at the food bank? One hundred and thirty volunteers and customers at the Philadelphia food bank were given a written questionnaire. Of these, 39 were completed and returned. That is a response rate of 30%. Are the results usable? Yes! Statistical generalization is not an absolute must. For the food bank, the results are very valuable because the Philadelphia Food Bank can use them to improve the system they have in place for handing out food.

Key concepts

Usability	The extent to which research has practical relevance.

Checkpoint 1.2

Which quality aspects were not taken into account sufficiently in the following studies?

- A company that produces baby milk pays for research into the effect on toddlers of vitamin D in this milk.
- The voting behavior of a panel is followed during election polls. The results will be validated on all voters who are entitled to vote.
- Research among students of the Fiducia Student Fraternity shows that students don't rate organized activities highly. But only five students took part in the survey.

1.3 Research phases

When you're designing and conducting research you are constantly asking questions, for example:

- What am I going to research?
- Why am I going to research it?
- Who am I going to research?
- How am I going to do my research?
- Where am I going to do my research?
- When am I going to do my research?

You don't only ask yourself these questions when you start researching, when you're busy designing your research. *During* the research, too, you continually ask yourself questions. You stop along the way and check your progress. You look back, and then forwards. Are things going according to plan? Are you on the right track when it comes to the content? What was the issue again? Are you on schedule? Are you within the budget? Sometimes you have to stop in your tracks, reconsider your whole research project, talk to your client or go back to the drawing board. Your findings are paramount because the organization you are doing the research for has to be able to use them. That is why you go over and over again this process of 'marking time', looking back and forwards and moving on again, like a cycle (see Figure 1.1).

Research has a fixed structure throughout the process. It consists of several *research phases*. That applies to fundamental and applied research alike. All researchers, students and teachers go through these phases. At the end of all these phases, the researcher will answer the main question of the research. Often, questions are not only answered, new ones are raised, which can then be answered in a subsequent study.

This section shows what such a fixed structure (also referred to as a research *cycle*) looks like and how it produces a research report as well as a professional product.

Research cycle

1 Design

The most important objective in this phase is that you achieve a proper objective and central question. If you don't do this properly, you run the risk that your research will become unwieldy and you won't be able to draw clear and usable conclusions.

The next step is to design your research, showing how you intend to address the question, which data collection methods you will use to do so, how much time, what you'll need, and who will be involved in your research. You also specify

which research instruments you'll be using. Finally you specify how you are going to analyze the information, and which method you will be using for this.

Taking clients into account
In applied research you have to take your clients into account. Perhaps there is already a research question, a problem, an intervention measure or a diagnosis, and the client wants you to work on it. That said, often the problem still needs to be demarcated and turned into something you can work with. You may do some preliminary research for this. This involves talking to experts at the organization, reading documents, attending meetings and so on.

2 Data collection
After you have finalized the design, you go on to conduct the research. This is when you go about collecting the information that you need to answer the research question or questions. There are many strategies for this, depending on the number of subjects (people, objects, organizations) that you will be researching, the nature of the question (does it lend itself to qualitative or quantitative research?), and the time and budget available.

3 Analysis
You then go on to process and analyze the data that you have gathered. As is the case in Phases 2 and 3, there are several methods to choose from when it comes to data analysis, both qualitative and quantitative (for numerical information), depending on the kind of data collected. This will be discussed later in this method.

4 Evaluation and recommendations
At the reporting stage, you look all the way back to the beginning: what was it that you were researching, which methods were used, did you manage to answer all the questions using these methods and, if so, what are the answers? What recommendations can be made? Are there any other opportunities for research? How can we evaluate the research project? Is it good quality research? Or are their issues to do with the content and/or research design? After that, you write your report.
Generally research is completed once you've written the report and presented your findings. But these findings may also lead to follow-up research. This may be relevant if the questions that remained unanswered can be addressed in the new research project. Or your research may be the first in a series of projects, as part of a tracking study, for example. (This is when information is collected over a period of time, to do with developments in the area under investigation. See Chapter 7.)

In Figure 1.1, there is a diagram showing the four phases of research. A part of this book is dedicated to each phase.

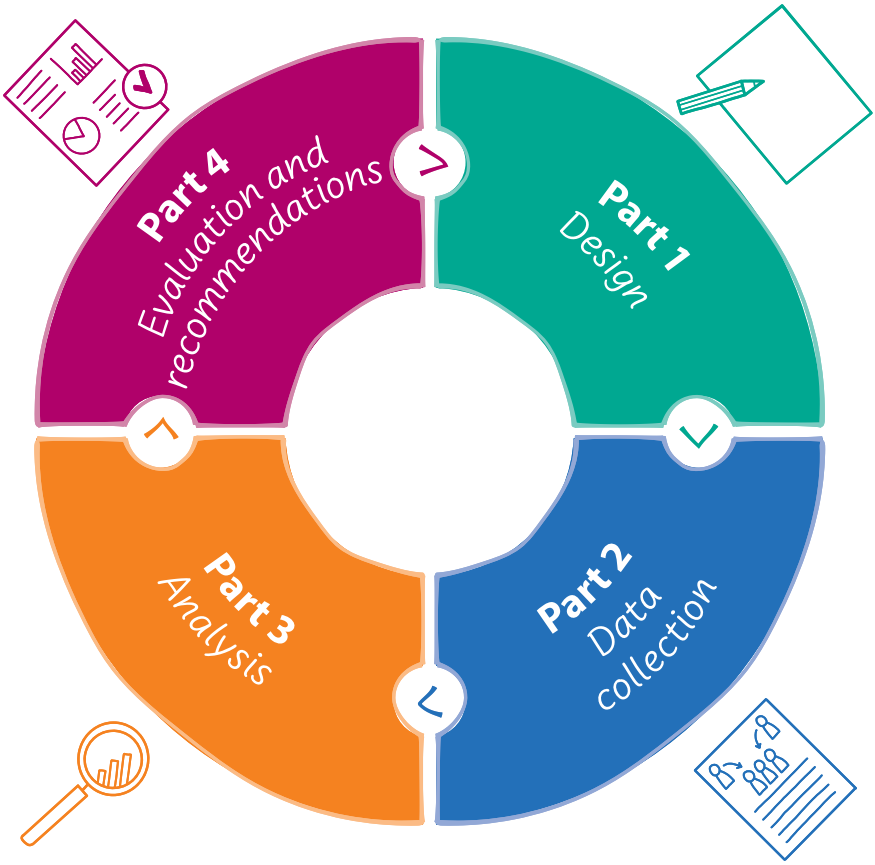


Figure 1.1 The research cycle showing the research phases

1.4 Research report or professional product?

Once you have completed all the phases of the research, you round the project off with a report that gives an account of the research methods used, and in which you present the results (Phase 4). But that is not the whole story. You can also summarize these results in an instrument that will be useful for the client. In other words, a *professional product*. These professional products vary depending on the discipline, subject and central question. It may comprise recommendations, a plan of action, a treatment plan, a proposal for measures or recommendations. If you are study engineering, your research may provide advice when using certain kinds of sustainable insulation materials. If you're an accountant, your professional product may consist of a new system for processing financial data. If you are a nurse, then your recommendations may be about implementing a treatment plan.

So it is important to ask yourself how the research will be used. What is the role of your research? Its purpose? Will you be writing a report about it, or will you use it to give advice, or to present a design or plan of action? Nowadays clients and internship companies are more likely to ask for a professional product rather than a research report. This does not detract from the fact that research is an essential part of your project. But in the final phase of your project, when you draw your conclusions, there will be another element: the professional product.
The choice between a research report and a professional product is actually not that important. What is important is to realize that the journey you take is roughly parallel and that you have to use the same toolkit, the same research skills in the process.
In short, the results are different depending on your professional practice, regardless of whether you produce a professional product or only a research report. But the method used, the controls, the technique, analysis and justification are the same. These are the phases of your research project. So the cycle that you go through to arrive at a professional product is the same as for a research report (Figure 1.1), the difference being that a product follows the evaluation.

Checkpoint 1.3

- Example 1.14 shows you how a study among volunteers is planned. Which research phases do you recognize in this example?
- What could the end product be here: a research report and/or professional product? Why?

Example 1.14 Volunteers society

The Greendale Volunteers Society wants answers to the following question: how can the Volunteers Society attract volunteers from the surrounding municipalities? A researcher compiles a questionnaire with several practical questions for the volunteers they already have. The questions are about background characteristics, like age, gender, level of education, and about how they spend their time and what motivates them. The researcher uses a scale that has already been used to measure motivations for volunteering (Lindeman, 1996). This motivation scale is the result of the preliminary research that the researcher conducted. The scale consists of statements that relate to social contacts, caring for others, the satisfaction it gives and the contribution to society. The volunteers interviewed indicate to what extent they agree with the statements. This gives insight into their motivation to help as volunteers. The results help the Volunteer Society to organize a campaign for attracting new volunteers.

Source: adapted from www.vrijwilligershuis.nl

Website

Go to this book's website.

Test your knowledge based on:
- the answers to the questions in the checkpoints
- the extra assignments with feedback
- the concepts trainer
- the knowledge test

Handy tools:
- research tools: checklists, questionnaires and templates for setting up a logbook and a research proposal

Doing Research is a clear introduction to the methods and techniques required for research. It answers questions like: what does 'doing research' actually mean, how do you design a research project, what steps do you have to take, how do you collect data and what are the pitfalls?

Doing Research sheds light on the complicated process of research. It teaches you research skills one step at a time. It discusses the theory based on the four phases of applied and fundamental research: design, data collection, analysis, and evaluation and recommendations. Many up-to-date examples are used to establish the link to everyday practice.

This 5th edition has been completely revised. The various research steps are presented in clear procedure guides, so that it is easy to see where you are in the research process. Each chapter also has checkpoint assignments to test whether you have understood the theory correctly. You can find practical tools, tests and answers to the checkpoint assignments on www.doingresearch5thedition.com.

Doing Research is suitable as an introduction for students in higher education, but it can also be used as a reference book for applied research.

Nel Verhoeven is an independent senior research consultant. She advises and supervises fundamental and applied research projects. She also gives various lectures, workshops and courses. She is the author of several successful teaching methods in the field of methodology.

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