

Research Data

Research Questions

Context & Ethics

INTRODUCTION TO RESEARCH METHODS IN EDUCATION

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LEARNING OBJECTIVES

After studying this chapter you should be able to:

- Define the empirical criterion for research questions
- Define a value judgement, and describe the fact-to-value gap
- Describe the two main views of causation, and explain why causation is a difficult concept in empirical research
- Name substitute terms for cause and effect
- Describe the process of measurement and its relationship to scaling
- Discuss, in general terms, when measurement is appropriate in research and when it is not

5.1 THE EMPIRICAL CRITERION

The essential idea of the empirical criterion for research questions is that a well-stated research question indicates what data will be necessary to answer it. It is useful to apply this criterion to all research questions, as they are developed. Another way of saying this is that 'a question well asked is a question half answered' – the way a well-asked question is stated shows what data will be necessary to answer it. Since empirical research means collecting data, we will not know how to proceed if the research questions do not give clear indications of the data needed to answer them.

This criterion applies most clearly to prespecified research questions. What about when there are no clearly prespecified research questions – where, instead, the research strategy is for the questions to emerge? There still has to be a close fit between questions and data, but now, rather than questions leading to data, we may have data leading to questions. In fact, it is more likely that there will be a 'reciprocal interaction' between the questions and the data. In this sort of unfolding situation, the question identification and question development processes are delayed. Instead of before the research, they come in later, with the data influencing the way the questions are identified and developed. But it is still important that the questions and the data fit with each other, so the criterion is applicable, whether the research questions are prespecified or whether they unfold.

5.2 LINKING CONCEPTS AND DATA

Empirical research requires the linking of data to concepts, the connecting of a concept to its empirical indicators.¹ In quantitative research, this idea is described as operationalism. Variables have conceptual definitions, where they are defined using abstract concepts, followed by operational definitions, where they are connected by means of empirical operations to data indicators. The same idea applies in qualitative research, but comes up in the analysis of data.

The empirical criterion stresses the link between research questions and data, or between concepts and their empirical indicators. This link is an important part of the fit between the different parts of a research project. It is also part of the overall logical chain within a piece of research. Tight logical connections are needed between all levels of abstraction in that chain. Figure 2.1 in Chapter 2 shows the different levels of abstraction in theories, empirical generalizations and first order facts. First order facts are very concrete, empirical generalizations use abstract concepts, and theories use even more abstract concepts. There must be firm connections between concepts at each level of abstraction in this hierarchical structure.

We can illustrate these points using Charters' example in his discussion of the hypothesis, remembering that a hypothesis is a predicted answer to a research question. Charters (1967) shows propositions at different levels of generality, and demonstrates the need for logical links between those levels.²

- | | |
|--------------------------|--|
| Theoretical Proposition: | Aggression occurs when a person is frustrated in getting to his [<i>sic</i>] goals. That is, whenever a person is prevented from getting something he wants, an aggressive urge arises within him that induces him to behave aggressively towards the party responsible for his frustration. |
| Conceptual Hypothesis: | Elementary school children who are prevented by their teacher from going to recess on a sunny day will express greater hostility in their remarks to the teacher during the remainder of the school day than elementary school children who are not prevented by the teacher from going to recess, other things being equal. |
| Operational Hypothesis: | The ratio of 'hostile' to 'non-hostile' remarks made by pupils and classified as 'directed towards teacher', based upon the observation of classroom interaction by a trained observer between 2.00 and 3.30 in the afternoon of sunny days, will be significantly lower under Condition A (27 second grade pupils in Hawthorne School whose teacher said, 'You may go to recess now') than under Condition B (36 second grade pupils in Hawthorne School whose teacher said, 'Instead of going to recess today, I think we had better work some more on spelling'). |

In a tightly prefigured quantitative study such as is used in this example, the linking of concepts and data is done ahead of the empirical work of data collection and analysis. The link is made *from concepts to data*. In the language of quantitative research, the variables are operationally defined. In a more 'open-ended' qualitative study, say a grounded theory study, that linking is done during the empirical work. In fact, one purpose of such a study is to develop concepts linked to, or grounded in, the data. In that sort of study, the link is made *from data to concepts*. Earlier, in the comparison between theory verification and theory generation research, I used Wolcott's theory-first or theory-after description. Here, it is concepts-first or concepts-after. Whenever it is done, before or during the empirical part of the research, the careful linking is necessary, and the principles are the same. These same points are stressed by Lewins (1992).

It is useful to apply the empirical criterion to all research questions. When all questions satisfy this criterion, we are ready to move from content to method. When research questions fail the test of this criterion, one of two situations will usually apply. Either we have more conceptual-analytic question-development work to do, which means that the questions are most likely still not specific enough. This is typical of questions that are being developed deductively, from the general to the specific. Or we have research questions that are faulty in some way. This leads to the topic of good and bad research questions.

5.3 GOOD AND BAD RESEARCH QUESTIONS

It follows from Chapter 4 that good research questions are:

- clear – they can be easily understood, and are unambiguous;
- specific – their concepts are at a specific enough level to connect to data indicators;
- answerable – we can see what data are required to answer them, and how the data will be obtained;
- interconnected – they are related to each other in some meaningful way, rather than being unconnected;³
- substantively relevant – they are interesting and worthwhile questions for the investment of research effort.

Bad research questions fail to satisfy one or more of these criteria. Mostly, this is because they are either unclear and not specific enough, or they fail on the test of the empirical criterion, which is expressed in the second and third points above.

If we cannot say how we would answer each research question, and what evidence would be required to answer it, we cannot proceed.

While there are many different ways in which research questions can be inappropriate or unsatisfactory, there are two types of problems that often occur. The first concerns value judgements, the second concerns causation. Both are important philosophical issues, and both have been prominent in the paradigm discussions referred to earlier.

5.4 VALUE JUDGEMENTS

Value judgements are moral judgements or statements. They are statements about what is good or bad, right or wrong (or any synonyms of these words), not in the sense of instrumental values (means) but in the sense of terminal values (ends). They are often described as statements of 'ought' (or 'should'), and are contrasted with statements of 'is'.⁴ The problem is that it is not clear how (or whether) we can use empirical evidence to make such value judgements. There are two main positions on this important issue.

One position is that we cannot use empirical evidence in the making of value judgements, because of the so called 'fact-to-value gap'. The fact-to-value gap maintains that there is a fundamental difference between facts and values, and that, because of this difference, there is no logical way to get from statements of fact to statements of value. If this is true, it means that evidence is irrelevant to the making of value judgements, and that value judgements cannot be justified by evidence. Some other basis will be required for their justification. For proponents of this view, science must remain silent on value judgement questions, since scientific research, being based on empirical data, can deal only with the facts. This is not a small problem, since value judgements are among the most important judgements people (individually and collectively) must make. In this view, science has no role in making those value judgements. Nor do value judgements have any place in scientific inquiry. This is the conventional, positivist, 'science-as-value-free' view, and it has a long history.⁵

The other main position is that this gap is based on a mistaken dualism which sees facts and values as quite different things. In this view, that distinction is invalid, and the fact-to-value gap is therefore a misleading fallacy. The reasoning behind this view is not easy to summarize, but it is described by Lincoln and Guba (1985: ch. 7). In that chapter, they indicate the many possible meanings of values, they show why the fact-value dualism is discredited, they stress the value-ladenness of all facts, and they show the four main ways in which values have a direct impact on the research. They end their chapter with this plea that we discontinue the fallacious dichotomy between facts and values, and stop trying to exclude values from research:

At this point, *at a minimum*, we should be prepared to admit that values do play a significant part in inquiry, to do our best in each case to expose and explicate them ... and, finally, to take them into account to whatever extent we can. Such a course is infinitely to be preferred to continuing in the self-delusion that methodology can and does protect one from their unwelcome incursions. (1985: 186; emphasis in original)

This rejection of the positivist view comes from several quarters. Feminist scholars, for example, have repeatedly challenged the 'persistent positivist myth' (Haig, 1997) that science is value-free, and critical theorists and feminists alike regard the distinction between facts and values as simply a device that disguises the role of conservative values in much social research. Instead of value-free research, critical theorists especially argue that research should be used in the service of the emancipation of oppressed groups – in other words, that it should be openly ideological (Hammersley, 1993).

The attempt to produce value-neutral social science is increasingly being abandoned as at best unrealisable, and at worst self-deceptive, and is being replaced by social sciences based on explicit ideologies. (Hesse, 1980: 247)

While the positivist value-free position has a long history, opposition to it has grown strongly in the past 30 years. Ironically, the positivist position is itself a statement of values, and many see it as discredited in maintaining that inquiry can be value-free. The problem with the rejection of the value-free position, however, is that it is not clear where this leads.⁶ This can complicate the development of research questions, since the area of value judgements is controversial. In the face of these difficulties, I suggest three points to keep in mind. First, we should be aware that there are different positions on this issue, and therefore not be surprised if we encounter different reactions to it. Second, we should recognize when value statements are being made, and be careful about phrasing research questions in value judgement terms.⁷ We should be aware of synonyms for 'good-bad' and 'right-wrong', which may camouflage the value judgements, but do not remove the issue.⁸ Third, if value judgement terms are used in questions, we can first determine whether they are being used in the instrumental or terminal sense. If instrumental, we can rephrase the question to get rid of the value judgement term(s). If the terms are being used in the terminal value sense, we should indicate how the evidence will be used in relation to the value judgements.

5.5 CAUSATION

Scientific research has traditionally sought the causes of effects (or events or phenomena). Indeed, a useful definition of scientific research in any area is that it

seeks to trace out cause–effect relationships. In this sense, science reflects everyday life. The concept of causation is deeply ingrained in our culture, and saturates our attempts to understand and explain the world. On the everyday level, we find it a very useful way to organize our thinking about the world – the word ‘because’, for example, is one of the most central in our language, and in our world-view. As Lincoln and Guba (1985) point out, our preoccupation with causation may be related to our needs for prediction, control and power. Whether that is true or not, the concept of causation is deep-seated, and perhaps built into the way we think about the world.

But causation is also a difficult philosophical concept. What does causation mean, and how do we know when we have a cause (or the cause, or the causes) of something? The definitional question about causation has no easy answer. For example, Lincoln and Guba (1985: ch. 6) review six main formulations of the concept of causation. Similarly, Brewer and Hunter (1989) discuss different types of causes. Without going into the definitional details, one way to simplify this complicated issue is to see the difference between two main views of causation – the constant conjunction view and the necessary connection view.

The constant conjunction view of causation

In the constant conjunction view, to say that X (for example, watching violence on television) causes Y (for example, the development of anti-social attitudes) is to say that every time X occurs, Y occurs. This means simply that Y always follows X, that there is a constant conjunction between them. This view is clear enough, but it has a problem. Night always follows day, yet we don’t want to say that day causes night. Therefore constant conjunction alone does not seem to be enough to define causation.

The necessary connection view of causation

On the other hand, in the necessary connection view, to say that X causes Y is to say not only that X is followed by Y, but that X *must be* followed by Y. In this view causation means that the variables are necessarily connected. The problem with this view is that we cannot observe that X *must be* followed by Y. We can only observe whether or not X is followed by Y. We cannot observe the *must* or the necessity part. Since we cannot observe it, we must infer it. Thus causation, in this view, is not observable, it can only be inferred. It is, in other words, a metaphysical concept, not an empirical concept.

The necessary connection view of causation therefore leads to this question: Under what conditions is it plausible to infer that an observed relationship is a causal one? This is a difficult question, precisely because the world is full of relationships we can observe, but most of them are not causal. It is a question to which many answers have been proposed (see, for example, Rosenberg, 1968; Lincoln and Guba, 1985; Brewer and Hunter, 2005). Without attempting here a full treatment of this question, the main conditions for inferring

that X (watching violence on television) causes Y (the development of anti-social attitudes) are:

- The variables X and Y must be related, and this relationship must be demonstrated empirically.⁹
- A time order between the variables must be demonstrated, with the cause X preceding the effect Y.¹⁰
- There must be a plausible theory showing the links by which the variables are causally related – that is, the missing links which bring about the causal connection must be specified.
- Plausible rival hypotheses to the preferred causal one must be eliminated.

Perhaps no topic has received more attention in quantitative research design than this. For a long time, and in some quarters still, the experiment has been the preferred empirical research design, precisely because, by systematically eliminating rival hypotheses, it is the safest basis we have for inferring causal relationships between variables. We will see this in Chapter 10. More recently, there have been advances in designs for inferring causation, both in quantitative research through the development of quasi-experimental and non-experimental designs, and also in qualitative research (see, for example, Miles and Huberman, 1994: 143–71).

Different researchers have different views of causation (Huberman and Miles, 1994: 434), and the credibility of causal claims depends on the view one holds. Despite the resistance to the concept and terminology of causation among some qualitative researchers, and despite the view of Lincoln and Guba (1985) that the concept may have outlived its usefulness, it seems a safe assumption that many researchers will continue to want to think causally about the world. But it is important to be careful about the way we use the word cause(s). In particular, we need to remember that causation can only be inferred, according to the necessary connection view described above. This is one reason that the word cause(s) itself is not often used among experienced researchers. Other words are substituted. We therefore need to be careful about such statements in a proposal as 'In this research we will find the cause(s) of ...'. Still more must we be careful of statements in a finished report that 'In this research we have found the cause(s) of ...'.¹¹

On the assumption that we will retain the idea of causation, I suggest that we proceed as follows. First, when we are thinking causally, we replace the words cause and effect by other terms, choosing from those shown in Table 5.1, especially in quantitative studies. Second, we proceed to study the extent to which and the ways in which things are interconnected and variables are interrelated, according to whatever design we have chosen. Third, we reserve any causal description of observed relationships until it is time to interpret the results. It is one thing to observe, describe and report the relationship. It is another to

Table 5.1 Substitute terms for cause and effect

CAUSE	EFFECT
Independent variable	Dependent variable
Treatment variable	Outcome variable
Predictor variable	Criterion variable
Antecedents	Consequences
Determinants	

'Correlates' is sometimes used for both causes and effects. Sometimes 'cause-effect relationship' is replaced by 'functional relationship'.

interpret it, to say how it came about. If the interpretation we prefer is a causal one, we are on safe ground if we point out that this interpretation is an inference, and then argue for it on the basis of the sorts of conditions mentioned earlier.

The distinction in the third point just made is important, and will come up again later in this book. It is the difference between observing and describing a relationship between variables (or a connection between things), on the one hand, and interpreting that relationship, or explaining it and saying how it came about, on the other. The difficulty in research is not normally in showing that a relationship exists. The difficulty is more likely to lie in interpreting that relationship.¹² Later chapters will show that there has been much work done on this issue in both the quantitative and qualitative approaches. For now, it is important to see clearly this distinction between describing a relationship, and interpreting it.

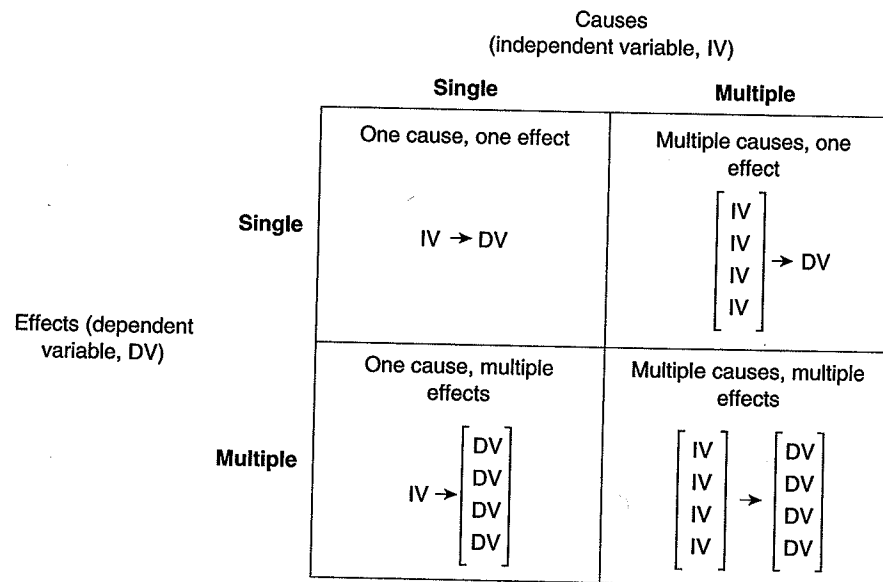
What terms can we substitute for cause and effect? In a quantitative context, instead of cause, we use the term 'independent variable'. Instead of effect, we use 'dependent variable'. These are the most common terms used in research. Other synonyms for these are 'treatment' or 'predictor' variable for independent variable, and 'outcome' or 'criterion' variable for dependent variable. In still other contexts, 'antecedents' and 'determinants' are used for causes, 'consequences' for effects, and 'correlates' for both. The main thrust of these terms is to get away from the metaphysical part of the term cause itself.

Two other points are made before leaving this topic of causation. The first is more applicable to quantitative research, the second to qualitative research. Both have implications for research design, and the analysis of data.

Multiple causation

The discussion in this section so far has been simplified, by talking basically about one cause and one effect, and by talking about only one direction for causation (from X to Y). In education research today, especially quantitative research, single cause and effect thinking is uncommon, and multiple causation is seen as much more realistic. Multiple causation means that there will likely be

Figure 5.1 Cause-effect combinations and designs



more than one cause, and probably several causes, for any particular effect. Effects are thought to have several causes, and these causes can act together in various ways, and can fluctuate in importance in how they bring about the effect. The terms 'multiple causes' and 'multiple causation' express these ideas. While the discussion in this chapter has been simplified, and put in terms of one cause and one effect, everything we have said about the nature of causes and the logic of causation holds for the more complicated case of multiple causation.

The same point also applies to effects. Much research has moved from a single effect to multiple effects. Multiple effects means that there will likely be several effects of any given cause, or set of causes. This move from single to multiple causes and effects has important consequences for research design, as shown in Figure 5.1. This diagram shows the various combinations of single and multiple causes and effects. In the top left-hand cell there is the one-cause/one-effect design, now rather outmoded in education research. In the top right-hand cell there is the multiple-causes/one-effect design, the most common design in quantitative research, and the basis of the important multiple regression approach to be described in Chapters 10 and 12. The bottom left-hand cell shows the one-cause/multiple-effects design, while the bottom right-hand cell shows the multiple-causes/multiple-effects design.¹³

Causation in qualitative research

The second point concerns causation in qualitative research. The term causation has positivist connotations (Hammersley and Atkinson, 1995: 233), and this,

combined with the difficulty of assessing causal claims, makes some qualitative researchers reluctant to use the concept. Some postmodernists, for example, as pointed out by Neuman (1994), reject the search for causation because they see life as too complex and rapidly changing. Thus causation has typically been a preoccupation of quantitative research.

However, as Hammersley and Atkinson (1995) point out, causal theories and models are common in ethnographic work, even if they are used implicitly. Similarly, Miles and Huberman (1994) make clear the importance of causation in qualitative research. Indeed, they claim that qualitative studies are especially well suited to finding causal relationships. Qualitative studies can:

... look directly and longitudinally at the local processes underlying a temporal series of events and states, showing how these led to specific outcomes and ruling out rival hypotheses. In effect, we get inside the black box; we can understand not just that a particular thing happened, but how and why it happened. (Huberman and Miles, 1994: 434)

and again

We consider qualitative analysis to be a very powerful method for assessing causality. ... Qualitative analysis, with its close-up look, can identify *mechanisms*, going beyond sheer association. It is unrelentingly *local*, and deals well with the complex network of events and processes in a situation. It can sort out the *temporal* dimension, showing clearly what preceded what, either through direct observation or *retrospection*. It is well equipped to cycle back and forth between *variables* and *processes* showing that stories are not capricious, but include underlying variables, and that variables are not disembodied, but have connections over time. (Miles and Huberman, 1994: 147; emphasis in original)

In *Qualitative Data Analysis*, Miles and Huberman show how causal networks can be developed to model qualitative data, just as causal path diagrams model quantitative data.

5.6 CONCEPTUAL FRAMEWORKS

A conceptual framework is a representation, either graphically or in narrative form, of the main concepts or variables, and their presumed relationship with each other. It is usually best shown as a diagram. Some sort of conceptual framework is often implicit, as the question development stage described in Chapter 4 proceeds. Often it helps in the development of the research questions to make this conceptual framework explicit. In these cases, development of both the research questions and the conceptual framework goes hand in hand. The direction of

thinking may be from the conceptual framework to the research questions, or vice versa, or they may interact with each other in some reciprocal way. Developing both together, like the questions themselves, is usually an iterative process.

Whether or not it is appropriate to have a predetermined conceptual framework depends on how much prior knowledge and theorizing are brought to the research. In discussing the development of research questions, it was pointed out that there is often considerable prior knowledge, and the same point applies to the conceptual framework. It is useful to get our prior knowledge and theorizing out on to the table, and organizing this into a conceptual framework as research questions are developed can bring several benefits:

- it brings clarity and focus, helping us to see and organize the research questions more clearly;
- it helps to make explicit what we already know and think about the area and topic;
- it can help considerably in communicating ideas about the research; therefore it can simplify the preparation of the research proposal, and can also make it more convincing;
- it encourages selection, and assists in focusing and delimiting thinking during the planning stage.

In quantitative research, where well-developed research questions are typical, the conceptual framework is common, usually in diagram form. The diagram(s) will typically show the variables, their conceptual status in relation to each other, and the hypothesized relationships between them. In qualitative research, there is, as usual, more of a range. Conceptual frameworks have generally been less common in qualitative research, but, as Miles and Huberman (1994) and Maxwell (1996) make clear, a strong case can be made for their usefulness there too. Example 5.1 refers to conceptual frameworks for both quantitative and qualitative studies.

EXAMPLE 5.1 CONCEPTUAL FRAMEWORKS

Quantitative

- Neuman (1994: 47) shows five conceptual frameworks to represent possible causal relationships between variables.
- Rosenberg (1968: 54–83) shows numerous conceptual frameworks to represent intervening and antecedent variable relationships.
- Calder and Sapsford (1996) show a variety of multivariate conceptual frameworks.

Qualitative

- Miles and Huberman (1994: 18–20) show conceptual frameworks for their studies on disseminating educational innovations, and on school improvements.
- Miles and Huberman (1994: 21) also show two conceptual frameworks used by other qualitative researchers: one an ethnographic study of minority children's school experience, the other an emergent conceptual framework for the study of the creation of a new school.

5.7 FROM RESEARCH QUESTIONS TO DATA

Once we have stabilized our research questions, and they are satisfactory in terms of the empirical criterion and the other criteria listed in section 5.3, we can move from content to method. The connection from content to method is through data – what data will be needed, and how they will be collected and analysed. Before we get down to details of method, therefore, we need to consider the nature of data.

What, exactly, are data? As noted earlier, synonyms for data are evidence, information, or empirical materials. The essential idea is first-hand observation and information about (or experience of) the world. Obviously, that could include all sorts of things, so data is a very broad term, and is subdivided into quantitative and qualitative. Both are empirical.

5.7.1 QUANTITATIVE DATA

The key concept here is quantity, and numbers are used to express quantity. Therefore quantitative data are numerical – they are information about the world, in the form of numbers.

Information about the world does not occur naturally in the form of numbers. It is we, as researchers, who turn the data into numbers. We impose the structure of the number system on the data, bringing the structure to the data. This means there is nothing 'God-given' about the numerical structure we impose – on the contrary, that structure is very much 'man-made'. It is therefore not inevitable, nor essential, that we organize our empirical data as numbers. The question is whether we find it useful to impose this structure on the data. If we find it useful (and if it is feasible), we should do it. If not, we are not at all bound to do it.

Measurement is the process by which we turn data into numbers. Measurement involves assigning numbers to things, people, events or whatever, according to particular sets of rules, as will be discussed in Chapter 11. Therefore to collect quantitative data is to collect measurements. By definition,

quantitative data collected with measuring instruments are prestructured, falling at the left-hand end of the structuring continuum presented in Chapter 2. The numerical structure is imposed on the data, ahead of the research.

Two types of operations produce numbers – counting and scaling. *Counting* is such a common everyday occurrence that we don't think twice about it. We do it automatically, it is straightforward and not problematic, and we find it extremely useful in dealing with the world. When we count, we are counting with respect to something. There is a dimension of interest, some scale or quantity we have in mind, which gives meaning to the counting.

Scaling is rather different,¹⁴ though again we do it all the time. The basic idea here is that we have in mind some characteristic, or property, or trait – we will use trait – and we envisage a continuum, or scale, ranging from a great deal (or perhaps 100%) of that trait, to very little (or perhaps 0%) of that trait. Further, we envisage different locations along that continuum, corresponding to different amounts of that trait. We use this sort of thinking and describing very frequently in everyday language, and it is not difficult to find many examples. Nor do we normally consider it a problem to do this. In other words the idea of scaling (though we do not normally call it that) is deeply ingrained into our world-view and into our language. This needs stressing because of the controversies that can arise with this same operation in a research situation. As a final step, in actual measurement, we assign numbers to represent those different locations along the scaled continuum. We do not normally make this last step in everyday life, and it seems to be here that the controversies arise. The idea of a scale is useful to us in everyday life because it helps us to be systematic in our thinking, and because it helps us to compare things (or events, or people) in a standardized way. Making standardized comparisons is something we often want to do, and measurement formalizes those comparisons, enabling us to make them more precise and systematic.

To summarize, quantitative data are data in the form of numbers, either from counting, scaling or both. Measurement turns data into numbers, and its function is to help us make comparisons. Although measurement is a technical tool, it is a technical tool with very great similarities to what we do with great frequency in everyday life. It is important to stress this point because the process of measurement itself has been at the centre of much of the debate between quantitative and qualitative researchers. Measurement seems also to have fostered entrenched positions in that debate. One entrenched position has been slavishly devoted to measurement, and believes only in research where the data are quantitative. The other has been just as slavishly anti-measurement, distrusting all quantitative research. In this book, I want to avoid such entrenched positions about measurement, which we can do by asking two questions. First, will it help us to measure what we want to study – that is, will it be useful for the comparisons we wish to make? Second, if it is helpful, is it in fact possible to measure in this particular situation. We will return to this question in Chapter 11.

Counting and scaling are part of measurement, and it is variables that are measured. The concept of a variable (something that varies) is central to quantitative research. Quantitative research design, together with its associated conceptual framework, shows how the variables are seen and organized with respect to each other. Quantitative data collection is about how the variables are to be measured, and quantitative data analysis is about how the measurements of the variables are to be analysed. Thus the concept of a variable, and the measurement of variables, are essential to the way quantitative research proceeds.

5.7.2 QUALITATIVE DATA

We have defined quantitative data as empirical information in the form of numbers. Qualitative data can therefore be defined as empirical information about the world, not in the form of numbers. Most of the time in education research, as noted earlier, this means words.

This definition covers a very wide range, and qualitative data do indeed include many different types of things. Denzin and Lincoln (1994) use the term 'qualitative empirical materials', and point out that it includes interview transcripts, recordings and notes, observational records and notes, documents and the products and records of material culture, audio-visual materials, and personal experience materials (such as artefacts, journal and diary information, and narratives). The qualitative researcher thus has a much wider range of possible empirical materials than the quantitative researcher, and will typically also use multiple data sources in a project. For some qualitative researchers, literally everything is data. In this book, we concentrate on qualitative data from observation (and participant observation), interviews or documents – or, as Wolcott (1992) puts it – on qualitative data from 'watching, asking or examining'.

We saw that quantitative data have a predetermined structure, being at the left-hand end of the structure continuum. What about qualitative data? As with research questions and research designs, qualitative data can fall anywhere along this continuum. Thus, they can be towards the left-hand end, and well structured, as in the case of standardized interview questions with response categories, or observations based on a predetermined observation schedule.¹⁵ On the other hand, qualitative data can be totally unstructured at the point of collection, as in the transcript of an open-ended interview, or field notes from participant observation. In this case, there would be no predetermined categories or codes. Rather, the structure in the data will emerge during the analysis. The basis of this structure is codes and categories, and they are typically derived from the data in the initial stages of analysis, as is described in Chapter 9.

Earlier, we saw comparisons between theory-before and theory-after, between concepts-before and concepts-after, and between research questions-before and research questions-after. Here it is a case of structure-before or

structure-after in the data. But here, with data, another point emerges. 'Structure-before' means that the researcher imposes codes, categories or concepts on the data – these are researcher-imposed concepts. Measurement in quantitative research is a clear example of concepts and structure imposed on the data by the researcher. By contrast, 'structure-after' allows respondents in research to 'tell it in their own terms' to a much greater extent.¹⁶ This is often a big issue in a research project. A common criticism of prestructured data is on this very point – that prestructuring the data does not permit people to provide information using their own terms, meanings and understandings. On the other hand, when we collect data using people's own terms and meanings, it is difficult to make standardized comparisons. This is an example of the sort of choice often facing the researcher. Like all other such choices, it needs to be analysed, and there are advantages and disadvantages of each way of doing it. Thus, it will often seem good to begin with the data in respondents' own terms and concepts. But the systematic comparisons that structure and measurements permit are also valuable, and they require that the same terms and concepts be used across different respondents – that they be standardized. That suggests combining the two approaches in such a way as to retain the advantages of each. Some ways of doing that are given in Chapter 13.

Open-ended qualitative data are often appealing to researchers who are keen to capture directly the lived experience of people. But unstructured qualitative data require some processing to prepare them for analysis. Therefore the data themselves represent a text constructed by the researcher. It is one thing to experience (some aspect of) the world. It is another thing to represent that experience in words. Once data are put into words, it is the researcher-constructed text that is used in the analysis. It is inevitable that the words we use to record data from the field will reflect, to some extent, our own concepts. Thus, as Miles and Huberman (1994: 10) write, behind the apparent simplicity of qualitative data there is a good deal of complexity,¹⁷ requiring care and self-awareness from the researcher. In this sense, too, qualitative research is similar to quantitative – in both, the researcher brings something to the data.

5.8 COMBINING QUANTITATIVE AND QUALITATIVE DATA

We can now summarize these sections on the nature of data. Quantitative data are information about the world in numerical form, whereas qualitative data are (essentially) information about the world in the form of words. Quantitative data are necessarily structured in terms of the number system, and reflect researcher-imposed constructs. Qualitative data may range from structured to unstructured, and may or may not involve researcher-imposed constructs. The basic difference between the two types of data lies in the process of measurement, which has often

engendered rigid positions about research, and which has been at the centre of debates between proponents of the two approaches.

To move past these rigid positions does not of course mean that we must combine the two types of data – only that we can do so when appropriate. Thus there are three possibilities for any empirical study:

- it can have all quantitative data;
- it can have all qualitative data; or
- it can combine both types of data in any proportions.

Which of these three should apply is not a matter for rules. The type of data we finish up with should be determined primarily by what we are trying to find out, considered against the background of the context, circumstances and practical aspects of the particular research project. Concentrating first on what we are trying to find out means that substantive issues dictate methodological choices. The 'substantive dog' wags the 'methodological tail', not vice versa.

This topic of combining quantitative and qualitative data is discussed again in mixed methods research in Chapter 13. Before that, we have to look in detail at each of the two different types of data – the designs which produce them, the methods for collecting them, and how they can be analysed. For ease of presentation, we now separate out the qualitative and quantitative approaches, and deal with them separately. Thus Chapters 7, 8 and 9, deal with qualitative research, and Chapters 10, 11 and 12 with quantitative research. In both cases, we deal first with design, second with the collection of data and third with the analysis of data. The two approaches are brought together again in Chapter 13. Before all of that, Chapter 6 discusses literature searching and reviewing.

CHAPTER SUMMARY

The empirical criterion: a well-stated research question indicates what data are necessary to answer it

Concepts and data: the importance of logical connections across different levels of abstraction

Value judgements: moral judgements or statements, statements of values; fact-value gap – important distinction or misleading fallacy?

Causation: constant conjunction view versus necessary connection view; substitute terms for cause and effect – independent and dependent variables; multiple causation – several independent variables, one dependent variable

Quantitative data: numbers, come from measurement

Qualitative data: words (mostly), come from watching, asking, examining