

Chapter 10

Multicomponent and cognitive interviewing

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This chapter explores the use of multicomponent interviewing for researching beliefs.

Multicomponent interviews combine multiple methods into a single interview protocol with the intention of exploring the construct under investigation from different perspectives. This is particularly useful when researching beliefs that are difficult to articulate, such as beliefs about the nature of knowledge and nature of knowing (i.e., epistemic beliefs). Cognitive interviewing, a method used to gain more nuanced understanding of participants' responses on questionnaires, can be used as one component in a multicomponent interview.

Introduction

Researching beliefs can be challenging because individuals can hold beliefs but find it difficult to articulate them (Kagan, 1992). In this case, or when beliefs are perhaps implicitly held, using multiple methods of data collection is helpful to explore beliefs in more nuanced ways than can be achieved through single approaches alone (Schraw & Olafson, 2015). This chapter explores multicomponent interviews and cognitive interviews as methods for researching beliefs.

Multicomponent interviews integrate multiple strategies into a single interview protocol rather than engaging the same participants with multiple separated data collection

activities. Within this chapter, we will explore how these interview protocols can be designed and implemented through careful selection and sequencing of components. These interviews can involve a range of other methods as components, which include both implicit and explicit attempts to access the beliefs of participants.

Cognitive interviewing, one method which could be used within a multicomponent interview, generally involves probing a participant's reasoning for their responses on another research instrument such as a Likert scale questionnaire. Cognitive interviewing is utilised here as a qualitative approach to gaining a deeper understanding of participants' beliefs, using prompts from previously developed quantitative research instruments.

Multicomponent and cognitive interviews are exemplified by a research study on teachers' epistemic beliefs about science and educational research, and their perceptions of the utility of educational research for practice. Epistemic beliefs are beliefs about the nature of knowledge and knowing (Hofer, 2000). They are particularly tricky to research because we rarely think about these beliefs, but we all have them, even implicitly, like lenses through which we consider information that we encounter (Schommer-Aikins, 2004). For a long time, the field has attempted to measure epistemic beliefs by means of quantitative Likert scale instruments (e.g., Schommer, 1990; Hofer, 2000). However, these approaches have received extensive criticism for their poor reliability and the lack of complexity as they tend to dichotomise beliefs (Sinatra, 2016). Researchers have been urged to reconsider this approach to exploring epistemic beliefs in favour of methods "designed to drill down" further than Likert scales can (Sinatra 2016, p. 484).

The specific example study being drawn on in this chapter asked the following research questions:

1. What are participants' beliefs about the nature of knowledge and knowing in Education Studies and science? (i.e. their epistemic beliefs)
2. What are the perceptions of pre-service science teachers towards Education Studies from their Initial Teacher Education?
3. In what way, if at all, are participants' epistemic beliefs connected to their perceptions of Education Studies?

These questions are important because teacher educators have long been concerned with the idea that pre-service and in-service teachers have negative perceptions of, and therefore disregard for, educational research (McGarr et al., 2017). There were some indicators that epistemic beliefs played a role in these perceptions (Joram, 2007), but it had not yet been considered how teachers' subject area epistemic beliefs might interact with their beliefs or perception of educational research as a distinctly different area of knowing.

How did I try to answer the questions?

Multicomponent interviewing

The term "multicomponent interview" is a simple descriptive term to illustrate that a single interview interaction with a participant may be constructed so as to contain a number of component parts. Each component may use a different method to provide different opportunities for participants to either explicitly articulate their beliefs or demonstrate them via narratives or activities where a researcher can make reasonable inferences about their beliefs (Pajares, 1992).

For a rather simple idea, generating multicomponent interviews has not received much attention in methodological literature. Some studies have previously reported constructing interview schedules with discrete sections, often to investigate different constructs (e.g., Arsenio & Willems, 2017); however, it is less frequent to find interview protocols that

explicitly integrate different research methods for researching the same construct. As such, this remains to be considered a rather novel approach (Frost et al., 2019).

Where multicomponent interviews have been utilised, they have drawn upon a range of other methods to assess beliefs. For example, Wilson and Clarke (2004) used multicomponent interviews (or as they termed it, 'multi-method Interviews') which involved combining several research instruments into an interview, including clinical interviewing, stimulated recall, and observation to investigate metacognition in mathematics. Similarly, Longaretti (2020), investigating perceptions of belonging during school transitions, also used multicomponent interviews, describing them as semi-structured interviews comprising multiple techniques, including card sort tasks, open-ended questions, and self-nominated scenarios. The selection of components to be included in a multicomponent interview will be dependent on the constructs under investigation and combining methods that have been effectively used for researching these constructs in prior research.

It is important to remain cognisant of the philosophical (epistemological and ontological) underpinnings of the methods being integrated into a multicomponent interview. Wilson & Clarke (2004) explores the issues with composite techniques, and Frost et al. (2019, p. 252) provide a useful example of mapping the linkages between the various interview components and their underpinning research epistemology and theoretical foundations. For the example study on teacher epistemic beliefs, the philosophical underpinning for using multiple approaches to assess the same construct came from critical realism. A critical realist perspective would suggest that seeking different sources of evidence to examine the same "real" thing could, in fact, result in seeing "different faces of the truth" (Yucel, 2018, p. 423), rather than for triangulation or verification. Metaphorically, it is like seeking evidence

for different sides of a cube, rather than the geometry-inspired notion of using multiple data sources to home in on a singular point of truth.

The components of the multicomponent interview in the example study included the use of autobiographical stories, accounts of aspirations for teaching, and other narratives to infer beliefs (Bullough, 2015). Narrative storylines about personal experiences can be particularly useful as a way to access beliefs more implicitly where inferences can be made about the beliefs held by participants for these contexts (Jordan & Stanovich, 2003). Concept cartoons were also used to elicit a participant's positioning and explore their underpinning beliefs (Naylor & Downing, 2007). Later, more explicit questioning was used to target beliefs about the nature of knowledge and knowing (Tsai, 2002). Finally, cognitive interview strategies were used to probe participants' responses to an epistemic belief questionnaire, though this component will be elucidated in further detail in the next section.

An important consideration is the sequencing of the component parts. The components of this example study moved from broad to specific. The initial components not only provided opportunities for participants to demonstrate beliefs that might be implicit in their educational experiences as students or teachers. Starting broad helped to build rapport and ease the participant into the interview and also allowed the specific content of the interview to emerge more naturally. It provided a background and context for the more specific content that would be explored later, particularly where explicit questions targeting epistemic beliefs could then be grounded by the interviewer in the context of the participants' own examples.

Cognitive interviewing

Cognitive Interviewing could be considered as a stand-alone method of investigating beliefs or could be included as one component part of a multicomponent interview. Cognitive interviewing is most commonly known for its use in the development of, and ensuring the validity of, questionnaires (e.g., Karabenick et al., 2007). However, their use in answering more deeply qualitative questions has been effectively demonstrated by other scholars, particularly in the case of epistemic beliefs (Greene et al., 2010).

There are a number of approaches to cognitive interviewing, but a key feature is to use participants' responses to questionnaire items to probe more deeply, or 'drill down', into their underlying beliefs. An important first step in conducting a cognitive interview, then, is to identify the instrument, or particular items, that would provide suitable prompts to investigate the construct of interest. In the case of the example study, the construct of interest was epistemic beliefs, in the discipline of science and in Education Studies. The "Discipline Focused Epistemic Belief Questionnaire" (DFEBQ) was selected for use because it was specifically designed to assess and compare epistemic beliefs in two different disciplines (see Hofer, 2000). As the questionnaire's Likert scale items are designed to specifically target epistemic beliefs, exploring the reasoning behind the participant's agreement or disagreement with the item will necessarily involve an exposition of their epistemic beliefs, but with sufficient scope to explore the complexity of their position. During a cognitive interview, it may be beneficial to capture a full account of how the participant answered the question, not just in recording and producing a verbatim transcript but by also including interviewer observations, comments, or thoughts that occur during the process (Miller et al., 2014). These might be illuminating for understanding the multi-layered meaning of how the participant responds. The interviewer might also probe uncertainties, contradictions, or caveats that the participant appears to show. The selection

for which items to probe using cognitive interviewing strategies may be based on a number of concerns. One methodological challenge posed, however, is that encouraging participants to reflect on internal contradictions might do more than illuminate the underlying beliefs for the researcher; it might influence a change in those beliefs! This is no reason to shy away from the activity, because even if some change occurs during the process, the reasons for the prior beliefs and newly formed beliefs can be reported. For example, in this study, one participant stated:

If you approach educational studies in the same way that you approach a scientific study, you should be able to, after years of testing, arrive at a law.

While this is illuminating in terms of how they believe knowledge is produced in science and Education Studies, they also immediately think aloud: “But I have never heard of a law in education”. It seems that this participant was actively processing their beliefs during the interview, revealing prior beliefs, and potentially reassessing them in the moment. It might be argued that this reduced the reliability of the study, as their expressed ideas are only partially formed and susceptible to change immediately. However, it would be these partially formed beliefs that would have acted as the filters to experiences and guides for action.

Selecting salient responses, as opposed to probing every response of a questionnaire, is an important methodological decision. The interview protocol is at risk of becoming unwieldy and burdensome to the participant if a full cognitive interview is conducted (i.e., probing every question item). Instead, the participant can complete the questionnaire in their own time, prior to the interview, and the most salient responses can be probed. The obvious trade-off to this approach is that not all participants will be probed on the same items and, therefore, their responses may not be directly comparable. However, if a study takes a more

idiographic approach, where it matters more what the individual believes in totality or how they change internally over time rather than how they compare with others, then it will not likely be a significant concern.

What did the data look like and how did I analyse it?

Multicomponent interviews can be time-consuming and the resultant data may be extensive. Transcripts can be analysed in numerous ways depending on the purpose. Each component will generate qualitative data which can be analysed separately or together as a single corpus. In the example study, each of the interviews was transcribed verbatim and in full. This was important because beliefs and perceptions elicited by different components would need to be concurrently considered for an individual participant, and because the inductive analysis needed to be comprehensive across all utterances of the participant. The research questions required that the interview transcripts be analysed for (1) epistemic beliefs in science and in Education Studies, (2) perceptions of Education Studies, and (3) the connections between the epistemic beliefs and perceptions. These will be discussed in turn. However, it is worth noting that these analyses are examples which show possibilities for analysis rather than being central to the use of multicomponent interviews. In any research, the methods of analysis you choose to apply to your data will be dependent on your research questions. Using multicomponent interviews will not dictate any particular form of analysis.

Analysing epistemic beliefs (1) within an interview transcript will generally involve a deductive coding of segments of data against a pre-determined theoretical framework. This is possible because epistemic beliefs (or personal epistemology) are reasonably well theorised as a construct. This study used a modified version of Hofer's (2000) model of

personal epistemology/epistemic beliefs (see Table 10.1). This represents how there are a number of dimensions of epistemic beliefs (certainty, structure, justification, and source) and that there are a range of possible beliefs on each dimension. Originally, one end of the dimension would have been considered “naïve” and the other end “sophisticated”. However, epistemic beliefs are complex, and some nuanced middle ground might be the preferable or “more availing” position (Muis et al., 2014; Sinatra 2016). Therefore, I opted to describe the spectrum of beliefs between two polar ends and highlight the possibility of a preferred middle ground. In analysis, it was more important to describe and understand the roles these beliefs played in participants’ overall thinking.

Table 10.1 Adapted epistemic beliefs framework (Guilfoyle, 2018)

Dimension	Indicators		
	Polar end (1)	Middle ground (3)	Polar end (2)
Certainty [C]	Certain: fixed, stable, concrete, unchanging, undoubted, everyone would have the same answer.	Certain to varying degrees, depending on the discipline and area. Core and peripheral knowledge.	Uncertain: fluid, tentative, evolving, changing, best we know at the time.
Structure [St]	Simple: discrete, straight-forward, concrete facts. Isolated, unrelated, accumulated.	Generally, beliefs about knowledge as more complex than simple are preferable.	Complex: relative and contingent on other concepts. Inter-related and connected.

	Universal: knowledge is (or aims to be) applicable globally regardless of context.	Knowledge is generated in context, but can be generalised by various means, including transferability to similar contexts.	Particularistic: knowledge is (or aims to be) specific to the context in which it was generated.
Justification [J]	Authority/expertise: 'because an expert said so' – unwavering trust in authority.	Evaluation and integration of expert views and evidence.	Personal experience: because of personal experience, intuition, or evaluation of evidence.
Source [So]	Outside the self: from expert, authority source – e.g., teacher, scientist, book etc.	Recognising multiple sources can support a claim.	Within the self: from experience, intuition, own investigation

In this study, data from all components were considered as a single corpus. The use of both implicit and explicit elements in the multicomponent interview meant that both latent (underlying meaning) and manifest (surface meaning) needed to be considered against the theoretical framework. Some examples of this deductive analysis are presented in Table 10.2, along with the component of the interview from which they were drawn.

Table 10.2 Examples of segments of transcript deductively coded

Segment of transcript	Code	Interview component
And in science, yeah definitely. Things change all of the time. There are always	Certainty (science)	Cognitive interview

people doing research and changing
answers (Simone).

So, in a way, it is not constantly changing ... but ... it is changing gradually like (Donna).	Certainty (Education Studies)	Questions about the Nature of Knowledge
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In science, a theory is something that has been proven ... so it is your hypothesis and it has been experimentally repeated a number of times and then it becomes a theory (Haley).	Justification (science)	Concept cartoon
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I think the only place you can get that is experience. You have to see them fail and you have to see them succeed (Penny).	Justification (Education Studies)	Questions about useful knowledge for teaching
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Because [the lecturer] knew what she was talking about you felt you could actually trust what she was telling you (Monica).	Source (science)	Questions about their experiences of learning science
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So, if something works for me and the book said it mightn't then ... I would go with my own intuition (Lana).	Source (Education Studies)	Cognitive interview
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Analysis for perceptions of Education Studies (2), being a more ill-defined construct, required an inductive approach. This involved labelling and grouping segments of text with respect to the meaning, both surface and underlying. For example, the statement "[Education Studies] is learning how to effectively pass information on to other people It is learning to be a teacher! How to be a teacher" was ultimately included in a category

called “How-to/Prescriptive”, where participants perceived Education Studies as providing definitive guides for classroom practice. The analysis (3) involved drawing together the two separate analyses. Individual belief profiles, with labelled epistemic beliefs (1) and perceptions themes (2), were used to consider the patterns of co-existence of beliefs and perceptions. A complete discussion of this analysis is beyond the scope of this chapter. For more information, see Guilfoyle (2018, p. 123) and Guilfoyle et al. (2020).

What did the method allow me to see?

Table 10.2 shows that multiple components, including the cognitive interview, produced data to assess epistemic beliefs. But the cognitive interview also affords the opportunity to elicit more detail which might otherwise have been ambiguous in Likert scale responses. In this way, it is possible to note more middle ground positions and the complexity of the beliefs that are held. It is also possible to see how beliefs interact and change depending on the context.

The multicomponent nature of the interview allows for comparison of elicited beliefs in different contexts, giving a richer overall picture, by showing either how beliefs are consistent between components or that different components draw out more detailed justifications.

In summary, cognitive interviewing has advantages in terms of added depth, “drilling down” beyond what would be possible with Likert scales (Sinatra, 2016). Multicomponent interviews have advantages in that they can use both implicit and explicit strategies for assessing beliefs, which is beneficial when participants find it difficult to articulate their views or have never considered the construct/topic before. Different components within

the interview can be triangulated to support inferences about beliefs (Schraw & Olafson, 2015).

It is both an advantage and disadvantage that all components are brought together to a single point of interaction with the participant. It is an advantage because it negates the need for multiple separated data collection activities, which would be logistically challenging and risk attrition between activities. The disadvantage is that the single interview can become quite long. Researchers will need to carefully consider the time available and what would be reasonable to expect of a participant. It will then be necessary to pilot the interview protocol and inform the participant of an accurate estimate length of time required of them.

What are the key considerations in using this approach?

- How easy or difficult is it for your participants to articulate their perspectives?
Do you require implicit or explicit approaches? Or both? If your participants will likely find it difficult to describe their beliefs, or understand what beliefs you are asking them about, then you may need to consider using less direct approaches within the interview initially. Where more explicit approaches may be possible, sequence these towards the end.
- How much time is reasonably available for each participant? Multicomponent interviews and cognitive interviewing can both be time-consuming activities and it is important to ensure each interviewee completes each component to be able to fairly compare participants, if required.
- Is the construct well-theorised? Does it have defined boundaries or categories? Or is it ill-defined and without any pre-existing categories? This will influence

your analysis approach but also your ability to probe within the interview. If you know that you need to elicit participant perspectives on key dimensions of a construct, you can ensure each dimension is sufficiently explored.

Further resources

The following paper by Jeffery Greene and colleagues provides an insightful example of both sides to cognitive interviewing (i.e., its use in questionnaire development and its use as a qualitative method in its own right).

Greene, J. A., Torney-Purta, J., Azevedo, R., & Robertson, J. (2010). Using cognitive interviewing to explore elementary and secondary school students' epistemic and ontological cognition. In L. D. Bendixen & F. C. Feucht (Eds.), *Personal Epistemology in the Classroom: Theory, Research, and Implications for Practice* (pp. 368–406). New York: Cambridge University Press.

The following handbook edited by Fives and Gill is invaluable as a go-to-guide for considering the multiple ways that you might research (teacher) beliefs within a single interview.

Fives, H., & Gill, M. G. (2015). *International Handbook Research on Teachers' Beliefs*. Oxon: Routledge.

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