

THE ROUTLEDGE HANDBOOK FOR ADVANCING INTEGRATION IN MIXED METHODS RESEARCH

*Edited by John H. Hitchcock
and Anthony J. Onwuegbuzie*

First published 2022

ISBN: 978-1-138-36107-2 (hbk)

ISBN: 978-1-138-36106-5 (pbk)

ISBN: 978-0-429-43282-8 (ebk)

4

DEVELOPING THE META-INFERENCE IN MIXED METHODS RESEARCH THROUGH SUCCESSIVE INTEGRATION OF CLAIMS

Judith Schoonenboom

(CC BY-NC-ND 4.0)

DOI: 10.4324/9780429432828-6

4

DEVELOPING THE META-INFERENCE IN MIXED METHODS RESEARCH THROUGH SUCCESSIVE INTEGRATION OF CLAIMS

Judith Schoonenboom

The meta-inference in mixed methods research

A genuine mixed methods study culminates in a *meta-inference*, a conclusion that connects or *integrates* various claims, some resulting from the analysis of qualitative data, others from the analysis of quantitative data (Creamer, 2018, p. 110; Teddlie & Tashakkori, 2009, p. 152). As an example, López and Tashakkori (2006) compared the effects of two types of bilingual education programs (two-way, transitional) on the attitudes and academic achievement of fifth-grade students. Their meta-inference states that “two-way and transitional programs have differential effects, with the two-way programs having a more positive effect on the pace at which oral language is acquired, proficiency in Spanish, and attitudes toward bilingualism” (Teddlie & Tashakkori, 2009, p. 268).

The meta-inference is the final step in the mixed methods research process (Figure 4.1). It is the result of two successive phases. In Phase 1, claims are obtained through a process called *mixing methods*, in which qualitative data are collected and analyzed and quantitative data are collected and analyzed. Applying the separate qualitative and quantitative methods leads to separate qualitative *findings* and quantitative *findings*, and these separate findings, in turn, lead to separate conclusions or *claims*. The application of methods and obtaining of findings may proceed in various cycles. Quantitative methods may be applied on the basis of qualitative findings and vice versa, as indicated by the arrows between findings and methods in Figure 4.1 (Creswell & Plano Clark, 2018, p. 66). In Phase 2, claims obtained through qualitative research methods are connected to

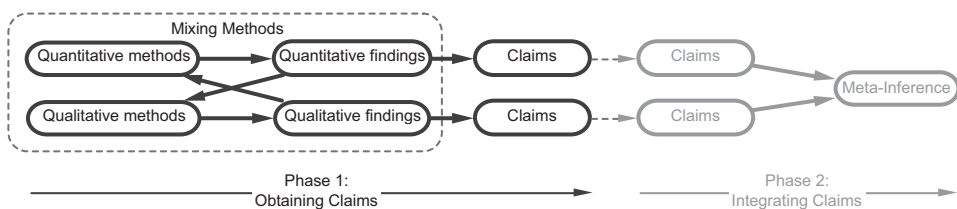


Figure 4.1 Mixing Methods and the Meta-Inference in the Mixed Methods Literature

claims obtained through quantitative methods – that is, claims from both types of methods are *integrated*. The result is a meta-inference, such as the one cited in the previous paragraph.

Through the integration of their claims in the meta-inference, the qualitative and quantitative methods become *mutually illuminating* (Bryman, 2007). However, as Bryman noted, in many studies intended as mixed methods studies, no actual mixing of methods or findings – and no integration of claims – takes place; the gray, integrating elements of Figure 4.1 are missing. As a result, there is no meta-inference. Such a study is not considered a real mixed methods study but rather two separate studies, one qualitative and one quantitative (the two separate research strands without connections in Figure 4.1).

Not surprisingly, the meta-inference is a highly valued outcome in mixed methods research (Uprichard & Dawney, 2019); it has been called the “hallmark” of mixed methods research (Moseholm & Fetters, 2017), it occurs “at the heart of mixed methods research” (Bazeley, 2018, p. 9; see also Tunarosa & Glynn, 2017), and “the actual dialectic mixing of consequence lies in the construction or composition of inferences, drawn from purposeful conversations of different threads of data patterns” (Greene & Hall, 2010, p. 125). The meta-inference is an indicator of a mixed methods study’s yield (O’Cathain et al., 2010) and quality. Some mixed methods scholars go even further by claiming that “the quality of the *entire research project* depends on the degree to which integration, blending, or linking of QUAL and QUAN inferences is achieved” (Teddlie & Tashakkori, 2009, p. 292; emphasis added). Thus, it is not the mixing of methods but the integration of inferences or claims that is ultimately important.

Paradoxically, however, the integration of claims has received very little attention in the mixed methods literature. When mixed methods scholars discuss integration, they are almost always referring to mixing methods, often called *integration of methods*, not integrating claims. In other words, they focus on the *obtaining claims* part of Figure 4.1. Bryman’s (2006) seminal article, for example, explains which methods are often used in mixed methods research, what purposes for combining these methods can be distinguished, and how often these were used in a representative sample of mixed methods studies. More recently, Maxwell et al. (2015) discuss “how to integrate *qualitative and quantitative methods and data*” (p. 227) and conduct studies that “provide valuable insights into the strategies, outcomes, and difficulties of *integrating qualitative and quantitative methods, data, and mental models*” (p. 228; emphasis added). Fetters et al. (2013) distinguish between integration at the study design level, methods level, and interpretation and reporting level. What is integrated at these levels are *qualitative and quantitative research procedures and data* (p. 2135), as well as *findings or results* (p. 2142).

One notable exception to this trend of ignoring claims is philosopher Nancy Cartwright, who has repeatedly pointed out the importance of paying attention to claims in designing mixed methods research (Cartwright, 2018; Cartwright & Hardie, 2012). Because a conclusion cannot be stronger than the premises on which it rests, researchers designing mixed methods research should examine the claims, sub-claims, and sub-sub-claims needed to support their main claim and should examine what evidence is needed to warrant these claims: “First mix the claims, then mix the methods” (Cartwright, 2018).

Given that the meta-inference is the most important outcome of mixed methods research, there is a knowledge gap. The mixed methods literature does not contain a discussion of the internal claim structure of meta-inferences, and there are no descriptions of how integration of which claims leads to the meta-inference in actual mixed methods research. As a result, the mixed methods literature provides little guidance for researchers on how to develop a meta-inference from actual data.

This chapter seeks to fill this gap. Using three real-life examples of mixed methods research, it will show how the meta-inference and its internal structure are developed in *successive steps* of

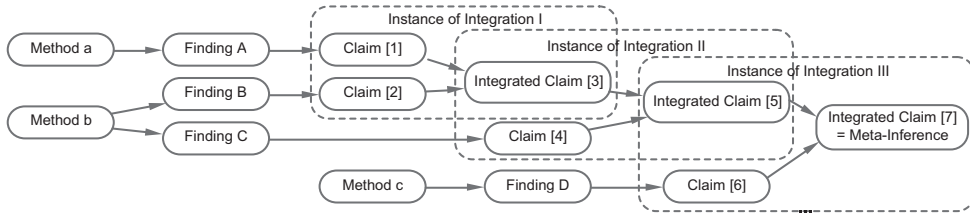


Figure 4.2 Emergent Development of the Meta-Inference in This Chapter

claim integration (Figure 4.2). It defines one such *instance of claim integration* as “one occasion during the research process at which two or more simpler claims are integrated into one more complex claim.”

Furthermore, this chapter will show that claim integration is not unique to mixed methods research but is visible in mono-method research as well. Finally, it discusses the general pattern of successive claim integration visible in the three real-life examples and describes the consequences for a view on the quality of mixed methods research.

Integration of claims in three real-life examples of mixed methods research

Example 1

The first real-life example is a study by Assen et al. (2016) investigating the influence of teacher beliefs on teacher behavior among so-called tutors, teachers at one Dutch university whose task it was to facilitate and to support the students’ learning process using a student-oriented approach, rather than a more traditional teacher-centered style of knowledge transmission. Their abstract reads as follows:

The purpose of this study was to explore the discrepancy between teacher beliefs and behavior in a Problem-Based Learning (PBL) environment. Using a survey and observations, this study demonstrated that tutors prefer learner-oriented beliefs, but in their teacher behavior they showed a more traditional approach to teaching. Analysis of semi-structured interviews indicated that this inconsistency could be attributed to the way in which problem-based learning is embedded in the curriculum, the confidence teachers have in the self-directed capabilities of students, and the self-confidence of teachers regarding their own facilitation skills.

(p. 12)

The claim structure of Example 1 is presented in Table 4.1.

Table 4.1 shows how successive integration of claims leads to a meta-inference. The final Integrated Claim (henceforth: IC) [8] is the meta-inference, as indicated by its heading. It is the result of a three-step process in which Claims [1]–[7] are integrated. Each instance of claim integration is displayed between horizontal lines. Instance of Integration I (henceforth: I) integrates Claims [1] and [2] into IC [3]. [1] had been derived from findings obtained through a survey, a quantitative method, whereas [2] had been derived from findings obtained through observations, a qualitative method. Accordingly, I bears the label *mixed methods* because it is an instance of integration through mixing methods. III is an instance of mixing of methods as well.

Table 4.1 Development of the Meta-Inference in Example 1

Obtaining Claims		Integrating Claims	
Methods	Claims	Integrated Claims	Connection
I. Mixed methods			
Survey	→ [1] Tutors prefer learner-oriented beliefs.	IC [3] Tutors prefer learner-oriented beliefs, but they show a more traditional approach to teaching.	Contradiction
Observations	→ [2] Tutors show a more traditional approach to teaching.		
II. Mono-method (qualitative)			
Semi-structured interviews	→ [4] Problem-based learning is embedded in the curriculum in a specific way.	IC [7] Problem-based learning is embedded in the curriculum in a specific way, and teachers have a certain amount of confidence in the self-directed capabilities of students and showed varying amounts of self-confidence regarding their own facilitation skills.	Juxtaposition
	→ [5] Teachers have a certain amount of confidence in the self-directed capabilities of students.		
	→ [6] Teachers showed varying amounts of self-confidence regarding their own facilitation skills.		
III. Mixed methods		Meta-Inference	
Survey & observations	→ IC [3] Tutors prefer learner-oriented beliefs, but they show a more traditional approach to teaching.	IC [8] Tutors prefer learner-oriented beliefs, but they show a more traditional approach to teaching because problem-based learning is embedded in the curriculum in a specific way and teachers have a certain amount of confidence in the self-directed capabilities of students and showed varying amounts of self-confidence regarding their own facilitation skills.	Explanation
Semi-structured interviews	→ IC [7] Problem-based learning is embedded in the curriculum in a specific way and teachers have a certain amount of confidence in the self-directed capabilities of students and showed varying amounts of self-confidence regarding their own facilitation skills.		

Note: IC = integrated claim.

It combines IC [3], derived from a quantitative survey and qualitative observations, and IC [7], derived from a qualitative semi-structured interview.

Perhaps surprisingly within a mixed methods study, II is an instance of *mono-method integration*: Claims [4], [5], and [6] are derived from the same data source, a semi-structured interview. As IC [7], these three claims together explain the contradiction of IC [3]. Each of them alone cannot explain the contradiction, but together they can. This means that they have to be integrated before they can form an explanation, which is done in II.

Integrated claims that are the result of integration earlier in the research process are often themselves integrated with other claims later in the process, so that, in the end, the meta-inference contains various integrated claims. In Table 4.1, IC [3] and IC [7] are integrated in III to

form IC [8], the meta-inference. In Table 4.1, the meta-inference IC [8] contains all claims that had been derived from the separate sources, namely [1], [2], [4], [5], and [6].

The connections among the claims within one instance of integration are described in the last column of Table 4.1 as contradiction, juxtaposition, and explanation, respectively. Thus, in IC [3], “[1] tutors prefer learner-oriented beliefs” is a contradiction of “[2] in their teacher behavior, they showed a more traditional approach to teaching,” indicated in Example 1’s abstract with the word *but*; in IC [7], “[4] the way in which problem-based learning is embedded in the curriculum,” “[5] the confidence teachers have in the self-directed capabilities of students,” and “[6] the self-confidence of teachers regarding their own facilitation skills” are juxtaposed, indicated by commas and *and*; and in IC [8], IC [7] is an explanation for the contradiction of IC [3] (“this inconsistency *could be attributed to* the way in which . . .”).

Example 2

A study by Clark and Moss (Clark, 2005) accompanied the redevelopment of the outdoor environment of a preschool in the United Kingdom. Their study involved 28 three- to four-year-olds, their parents, and preschool practitioners and managers. It answered two interrelated research questions: Which places do children see as important in this outdoor space? How do the children use these places? The children were involved in data collection and took photographs of important objects. One of the objects was the playhouse. According to Clark (2005):

Observing the children revealed the house to be a key resource for them. The children confirmed this through their photographs, the tour and their interviews. Parents also mentioned the house as an important space in the preschool. However, the interviews with practitioners showed that the house was a source of tension. They felt it was too small. The review with children, practitioners, and Learning through Landscapes recognised these opposing views and raised some possible solutions. The preschool has now turfed a new area for children to use to build their own temporary structures.

(p. 16)

The claim structure of Example 2 is displayed in Table 4.2.

Table 4.2 identifies six instances of claim integration, of which II, III, IV, and VI are instances of mixed methods integration. V involves mono-method integration: practitioners mentioned both [10] the playhouse as a source of tension and [12] their explanation (“the playhouse was too small”) in their interviews, perhaps even in the same sentence. Despite its narrow evidence base, IC [13] (“the playhouse is a source of tension, because it is too small”) nevertheless played an important role in the further development of the preschool environment: according to Example 2’s text, the review “recognised these opposing views,” and the preschool “turfed a new area for children to use to build their own temporary structures.”

A third form of integration is seen in I. Here, four claims derived from various qualitative methods are integrated: observations, photographs, tours, and interviews. This form of integration is called *multimethod integration*, the integration of claims derived from multiple methods that are of the same kind (i.e., either all qualitative methods or all quantitative methods).

Instances of integration II, III, IV, and VI each include one claim that is an integrated claim formed in a previous step. The labeling of each as a mixed methods or mono-method instance of claim integration depends on the variety of methods used in all previous instances of integration that lead up to the integrated claim. Thus, a meta-inference in mixed methods research will bear the label “mixed methods” because it involves at least one instance of mixed methods

Table 4.2 Development of the Meta-Inference in Example 2

Obtaining Claims		Integrating Claims	
Methods	Obtained Claims	Integrated Claims	Connection
I. Multimethod (qualitative)			
Observations	→ [1] The playhouse is a key resource for the children.	IC [5] The playhouse is a key resource for the children.	Confirmation
Contents of children's photographs	→ [2] The playhouse is a key resource for the children.		
Children's tours	→ [3] The playhouse is a key resource for the children.		
Interviews with children	→ [4] The playhouse is a key resource for the children.		
II. Mixed methods			
[Various qualitative methods]	→ IC [5] The playhouse is a key resource for the children.	IC [7] The playhouse is a key resource for the children.	Confirmation
Counts of children's photographs	→ [6] The playhouse is a key resource for the children.		
III. Mixed methods			
[Various qualitative methods and one quantitative method]	→ IC [7] The playhouse is a key resource for the children.	IC [9] The playhouse is a key resource for the children.	Confirmation
Interviews with parents	→ [8] The playhouse is an important space in the preschool.		
IV. Mixed methods			
[Various qualitative methods and one quantitative method]	→ IC [9] The playhouse is a key resource for the children.	IC [11] The playhouse is a key resource for the children, but it is also a source of tension.	Contradiction
Interviews with practitioners	→ [10] The playhouse is a source of tension.		
V. Mono-method (qualitative)			
Interviews with practitioners	→ [10] The playhouse is a source of tension.	IC [13] The playhouse is a source of tension because it is too small.	Explanation
	→ [12] The playhouse is too small.		
VI. Mixed methods			
[Various qualitative methods and one quantitative method]	→ IC [9] The playhouse is a key resource for the children.	IC [14] The playhouse is a key resource for the children, but it is also a source of tension because it is too small.	Explanation
Interviews with practitioners	→ IC [13] The playhouse is a source of tension because it is too small.		

Note: IC = integrated claim.

integration during its development process, but, as Tables 4.1 and 4.2 have shown, not all instances of integration leading up to the meta-inference involve mixing methods.

In IC [9], Claims [2], [3], [4], [6], and [8] all confirm [1]: “The playhouse is a key resource for the children.” In the absence of exact knowledge of the research process, Table 4.2 assumes that confirmation took place through three separate instances of claim integration (I, II, and III), based on the idea that in mixed methods research, evidence is commonly added step by step and thus integrated claims also develop step by step (Figure 4.2). The route to IC [9] may actually have been slightly different from Table 4.2. Given the various sources of qualitative data, however, the route almost certainly included several instances of integration that integrated two or more claims derived from multiple qualitative methods. In other words, it almost certainly contained multimethod instances of integration in addition to mixed methods integration.

Example 3

Glewwe et al. (2009) studied the effects of providing textbooks to schoolchildren in rural Kenya, in schools where textbooks had not been used before. They compared test scores of children in the 50 intervention schools with those of a control group, which showed no effect. In addition, the researchers went to each school and asked a child with a median score from each class to read his or her textbook aloud and to answer a few questions. Further subgroup analysis of the test scores was used to determine the differential effect for children with different pretest scores. According to their abstract:

A randomized evaluation in rural Kenya finds, contrary to the previous literature, that providing textbooks did not raise average test scores. Textbooks did increase the scores of the best students (those with high pretest scores) but had little effect on other students. Textbooks are written in English, most students’ third language, and many students could not use them effectively.

(p. 112)

The claim structure of Example 3 is displayed in Table 4.3.

Table 4.3 shows two additional forms of mono-method integration: within qualitative observations (II) and through quantitative subgroup analysis (III). Mono-method integration through quantitative subgroup analysis is a form of integration that has not yet been discussed in the mixed methods literature. It occurs when quantitative findings for one subgroup support a claim that is the opposite of the claim for the other subgroup, in this case Claim [7], “textbooks did increase text scores” for the children with high pretest scores, and Claim [8], “textbooks did not increase text scores” for the other children.

In addition, Table 4.3 displays two instances of integration involving claims not based on data collection within the study, called Previous research [1] and Reasoning [11] and [12]. Instance of integration I involves Claim [1] from previous research, “providing textbooks raises average test scores in primary schools.” A contradiction is noted between [1] and the quantitative findings of the study, which show that [2] “providing textbooks did not raise average scores in primary schools in rural Kenya.”

Reasoning in [11] and [12] is a shorthand for “reasoning on grounds other than collected data.” Thus, in V, labeled *Subgroup analysis & reasoning*, an explanation for [7] “providing textbooks did have an effect for students with high pretest scores” is found through reasoning without data collection. Drawing from their general knowledge, the researchers assumed that [11] textbooks can only have an effect for those who are able to read them, and from that, they

Table 4.3 Development of the Meta-Inference in Example 3

<i>Obtaining Claims</i>		<i>Integrating Claims</i>	
<i>Methods</i>	<i>Obtained Claims</i>	<i>Integrated Claims</i>	<i>Connection</i>
I. Previous research and quantitative methods			
Previous research	→ [1] Providing textbooks raises average test scores in primary schools.	IC [3] Providing textbooks raises average test scores elsewhere, but it does not do so in primary schools in rural Kenya.	Contradiction
Quantitative methods	→ [2] Providing textbooks does not raise average test scores for children in primary schools in rural Kenya.		
II. Mono-method (qualitative)			
Observations	→ [4] Most children could not read their textbook.	IC [6] Most children could not read its textbook because it is written in English, which is not their native language.	Explanation
Observations	→ [5] The textbook is in English, which is not the native language of the children.		
III. Mono-method (quantitative)			
Subgroup analysis	→ [7] Textbooks did increase the scores of the students with high pretest scores.	IC [9] Textbooks did increase the scores of the students with high pretest scores but not those of students with intermediate or low pretest scores.	Contradiction
Subgroup analysis	→ [8] Textbooks did not increase the scores of the students with intermediate or low pretest scores.		
IV. Mixed methods			
Quantitative subgroup analysis	→ [8] Textbooks did not increase the scores of the students with intermediate or low pretest scores.	IC [10] Textbooks did not have an effect for most children because they could not read their textbooks because these were written in English, which is not their native language.	Explanation
Observations	→ IC [6] Most children could not read their textbook because it is written in English, which is not their native language.		
V. Quantitative subgroup analysis & reasoning			
Subgroup analysis	→ [7] Textbooks did increase the scores of the students with high pretest scores.	IC [13] Textbooks did increase the scores of the students with high pretest scores because these children were able to read them.	Explanation
Reasoning	→ [11] Textbooks can only have an effect for children who can read them.		
Reasoning	→ [12] Most likely, students with high pretest scores were able to read their textbooks.		

(Continued)

Table 4.3 (Continued)

Obtaining Claims		Integrating Claims	
Methods	Obtained Claims	Integrated Claims	Connection
VI. Various strategies, including mixed methods		Meta-inference	
Previous research & quantitative methods	→ IC [3] Providing textbooks raises average test scores elsewhere, but it does not do so in primary schools in rural Kenya.	IC [14] Providing textbooks raises average test scores elsewhere, but it does not do so in primary schools in rural Kenya. Textbooks did not have an effect for most children because they could not read them because they were written in English, which is not their native language. However , textbooks did increase the scores of the students with high pretest scores, because these children were most likely able to read them.	Explanation
Mixed methods	→ IC [10] Textbooks did not have an effect for most children because they could not read them because they were written in English, which is not their native language.		
Subgroup analysis & reasoning	→ IC [13] Textbooks did increase the scores of the students with high pretest scores because these children were able to read them.		

Note: IC = integrated claim.

deduced that [12] “children with high pretest scores must have the ability to read their textbooks.” The derivation of both [11] and [12] did not involve data collection.

VI, which results in the meta-inference, bears the label *Various strategies, including mixed methods*. Because IC [3] and IC [13] involved the integration of claims that had not been derived from applying methods, VI, which integrates IC [3] and IC [13], also involves more than mixing methods.

Comprehensive inferences in mono-method research

Apparently, mixed methods studies also contain multimethod and mono-method integration, which raises the question of whether the meta-inference, this hallmark of mixed methods research, is truly unique to mixed methods research. Example 4 below shows that it is not, and that similar integrated, comprehensive inferences can be identified in mono-method research.

Example 4

González-Ocampo and Castelló (2018) studied the role of writing in doctoral training. Their study involved investigation of supervisors’ perspectives on doctoral writing and answered three related research questions concerning the role attributed to writing, writing support offered, and the relationship between the role of writing and the support offered. González-Ocampo and Castelló (2018) used one method of data collection, which was a written survey with

open-ended questions, and one method of data analysis, which was content analysis using Miles and Huberman (1994). Their sample consisted of 61 supervisors in the social sciences and humanities at several Spanish universities. One of their conclusions was that

in some cases, the role attributed to writing was not consistent with the writing support offered to students. This result may be related to the lack of awareness of many supervisors regarding how writing is supervised.

(p. 398)

The structure of this conclusion is displayed in Table 4.4.

Example 4 is a mono-method study that makes use of a survey with open questions analyzed through content analysis. It therefore can contain only instances of mono-method integration, in this case, contradiction I and explanation II. Similar processes to those seen in the mixed methods studies are visible here: a comprehensive inference is built, in this case, through a mono-method contradiction, followed by mono-method explanation. The final, comprehensive inference (in González-Ocampo & Castelló, 2018, p. 398), of which Example 4 is only a part, is much more complex and has a complexity similar to that of mixed methods Examples 2 and 3.

The contradiction→explanation pattern of integration

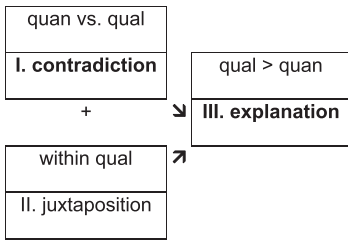
Having considered instances of integration separately, it is now time to uncover the main pattern of developing integration throughout a mixed methods study. Figure 4.3 shows that in the course of all four studies, one or more contradictions arise, which are subsequently explained. In Example 1, the contradiction is that tutors prefer learner-oriented beliefs but show a more traditional approach to teaching in the classroom. This contradiction is

Table 4.4 Development of a Comprehensive Inference in Example 4

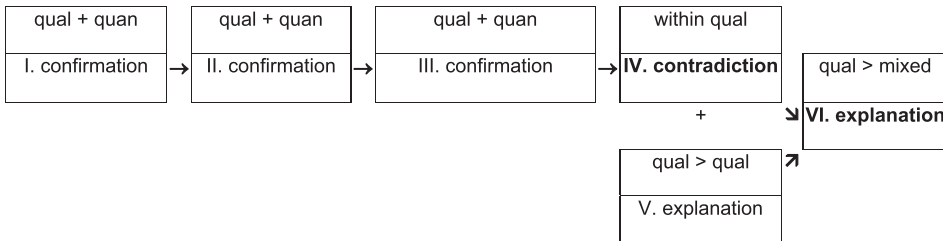
		<i>Obtaining Claims</i>		<i>Integrating Claims</i>	
<i>Methods</i>		<i>Obtained Claims</i>		<i>Integrated Claims</i>	<i>Connection</i>
I. Mono-method (qualitative)					
Survey with open questions	→	[1] Supervisors attributed a specific role to writing.	}	IC [3] The role attributed to writing was not consistent with the writing support offered to students.	Contradiction
	→	[2] Supervisors offered writing support to students.			
II. Mono-method (qualitative)					
Survey with open questions	→	[3] The role attributed to writing was not consistent with the writing support offered to students.	}	IC [5] The role attributed to writing was not consistent with the writing support offered to students. This result may be related to the lack of awareness of many supervisors regarding how writing is supervised.	Explanation
	→	[4] Supervisors showed a lack of awareness of how writing is supervised.			

Note: IC = integrated claim.

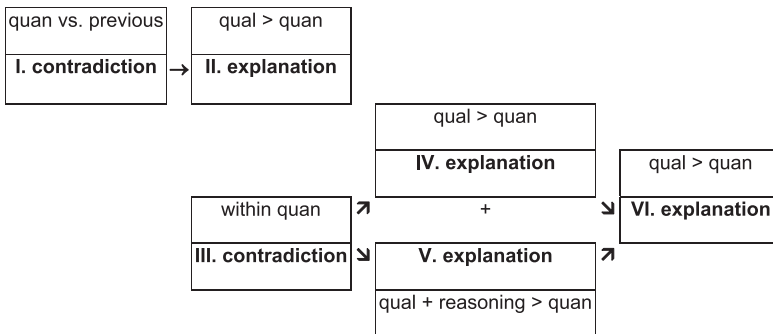
Example 1



Example 2



Example 3



Example 4

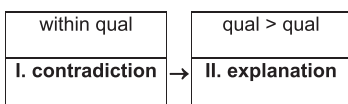


Figure 4.3 The Contradiction→Explanation Pattern of Integration in the Four Example Studies

Note: > = Explains; qual = Qualitative methods of data collection and data analysis; quan = Quantitative methods of data collection and data analysis.

explained via three factors: the way in which problem-based learning is embedded in the curriculum, the confidence teachers have in the self-directed capabilities of students, and the self-confidence of teachers regarding their own facilitation skills. In Example 2, after various confirmations of the playhouse as a key resource for the children, its positive role is contradicted by the statement that the playhouse is also a source of tension. An explanation for this negative aspect is that the playhouse is too small. Example 3 contains two

contradictions, each followed by an explanation. A first contradiction is that, contrary to previous studies, providing textbooks did not raise children's test scores in rural Kenya. This contradiction is explained by the fact that most of the children in the Kenyan primary schools could not read their textbooks. A second contradiction exists between these children and the few children with high pretest scores. For the children with high pretest scores, providing textbooks did have an effect on their test scores. The explanation is that, most likely, these children were able to read their textbooks. In mono-method Example 4, there is a contradiction between the role teachers attributed to writing and the support that they offered to students. This contradiction is explained by the fact that many supervisors lacked awareness of how writing is supervised.

Figure 4.3 shows that contradictions arise through diverse combinations of methods. There are contradictions between claims from quantitative and qualitative research (Example 1.I), within qualitative research (Example 2.IV and 4.I), within quantitative research (Example 3.III), or with previous research (Example 3.I). The explanation is always based on qualitative research, possibly combined with reasoning (Example 3.V).

In all four examples, the contradictions steer research in a specific direction. On the basis of the contradiction, the search for an explanation begins, and these explanations play an important role in the study, which is visible in the meta-inference. Even the "tiny" contradiction and its explanation in Example 2 ("the playhouse was a source of tension because it was too small") played an important role in the decision to allow the children to build their own temporary structures.

Discussion

A shift from study-level to individual instances of integration

This chapter has moved the level of describing integration away from the study as a whole (the final meta-inference integrating all claims at once in Figure 4.1) to the level of individual instances of integration (the various instances of integration in Figure 4.2). This resonates with Maxwell and Loomis's (2003) statement that "uncovering the actual integration of qualitative and quantitative approaches in any particular study is a considerably more complex undertaking than simply classifying *the study* into a particular category on the basis of a few broad dimensions or characteristics" (p. 256; emphasis added). Guest (2013) suggested classifying "points of interface" instead of studies. This chapter can be viewed as an elaboration of this idea.

As a result, this chapter has uncovered some forms of integration that remain hidden when individual instances of claim integration are not considered. First, it identified two forms of mono-method integration. It has shown that an explanation can be found within one method (e.g., within one interview) and that a subgroup analysis is a form of quantitative mono-method integration that might result in two different claims for two different groups. Second, it has shown that integration may involve claims from previous research or claims that are the result of reasoning without data collection.

Challenging the uniqueness of the meta-inference

As this chapter has shown, integration can also be achieved through mono-method research, and a mono-method study can also contain an integrated comprehensive inference. This raises the question of whether the characteristics ascribed to the meta-inference are unique to mixed

methods research. Again, the answer is that these characteristics can also be found in mono-method comprehensive inferences.

The meta-inference in mixed methods research “articulates an understanding of a phenomenon that is not contained in its separate parts” (Bazeley & Kemp, 2012, p. 61); it is a “negotiated account” (Bryman, 2007, p. 21). This applies to mono-method Example 4 as well. In the mono-method example, the contradiction arises by combining the role that supervisors attach to writing with the support that supervisors offer. Without one of these two parts, there would be no contradiction. Similarly, the explanation is developed by combining information about the role of writing and the support provided with information from the interviews. Without one of these three parts, there would be no explanation.

The meta-inference is “rarely a conclusion that could have been predicted from the literature” (Creamer, 2018, p. 110). Again, this applies to the mono-method Example 4 as well. It is highly unlikely that previous studies had shown that supervisors offer support in writing that differs from their view on writing because they are not aware of the role that writing plays in supervision. If this were true, the researchers likely would have used a different design to test this existing claim, and they would not have come to the conclusion that the contradiction “may be related” to a lack of awareness.

Also not unique to mixed methods research is the process through which integration of claims is achieved, a process described as “purposeful conversations . . . and integration,” “a cognitive process, conducted in dialogue by an inquiry team and in internal dialogue by a sole inquirer” (Greene & Hall, 2010, pp. 125–126), and “a meaningful two-way exchange of information and inferences” (Bazeley, 2018, p. 7). This cognitive process, purposeful conversation, or meaningful exchange is visible in the mono-method example: two claims of the study enter into a dialogue, this dialogue results in a contradiction, and a third claim continues the dialogue by proposing an explanation.

Integration is integration of claims

In this chapter, a research process of successive instances of claim integration has replaced the common idea in the literature that methods, data, and findings are mixed first and claims are integrated next (Figure 4.1). Rather than integration of methods and findings, this chapter foregrounds integration of claims. Claim integration is described as a process that occurs in steps, through several instances of integration, rather than all at once (Figure 4.2). Each individual instance of integration may or may not involve the mixing of methods.

This chapter is not in conflict with how the mixed methods research process as a whole is described in the methodological literature, as in, for example, “interaction between ideas and evidence results in a progressive refinement of the case conceived as a theoretical construct” (Ragin, 1992, p. 9) or “a meaningful two-way exchange of information and inferences” (Bazeley, 2018, p. 7). These ideas are compatible with this chapter’s Figure 4.2 but not with Figure 4.1, in which claims are integrated all at once.

Figure 4.2 brings another aspect of integration to the fore: whether an integrated claim is the meta-inference ultimately depends on where the study ends. As a study continues, more and more claims are integrated. The integration of claims could continue forever, and it is the researcher who decides where to stop. Where this happens might differ from the design plan. A researcher may, for instance, have planned to proceed until IC [5], but then decide to include and to integrate Claim [6], which turned up unexpectedly. Thus, Figure 4.2 shows that both the integration process and the mixed methods design process are *emergent*.

The contradiction→explanation pattern as the essence of mixed methods research

This chapter considers the contradiction→explanation pattern as the essence of mixed methods research. Rather than one of five possible purposes of mixed methods research (as in Greene et al., 1989) or one of 16 (as in Bryman, 2006), this chapter considers contradiction and explanation to be *the* characteristics of mixed methods research and, for that matter, much of mono-method research. Perhaps radically, Example 2 is not considered a genuine mixed methods study until a contradiction shows up, leading to a nuanced conclusion. Thus, although Example 2 begins with various instances of confirmation, obtained through integrating claims obtained from different methods, it has not utilized the potential of mixed methods research until the contradiction appears. A further development of this idea can be found in Schoonenboom (2019).

In itself, this pattern of contradiction and explanation is not new. It was described under the name of *abduction* by philosopher Charles Sanders Pierce long ago (Hoffmann, 1999) and has been recognized as very important in mixed methods research (Morgan, 2007; Wheeldon, 2010). This chapter has shown how abduction can be linked to integration.

Quality in mixed methods research

If the development of the meta-inference is an emergent process, then what counts as *quality* in mixed methods research should be redefined. According to Cartwright and Hardie (2012), the quality of the meta-inference depends on the quality of its premises, which is in line with the representation in Figure 4.1: the quality of the meta-inference depends on the quality of its constituting claims and cannot be stronger than its weakest claim. Conversely, and inspired by Greene (2007, pp. 166–167), this chapter offers the following general principle: “The quality of a mixed methods study depends on the extent to which the available data are used to further the claims involved.” The quality of a mixed methods study is most visible in, but not identical to, the number of instances of integration (Figure 4.2).

In Example 2, I to III had confirmed the claim that “the playhouse is a key resource for the children.” Yet, the contradiction in IV and its subsequent explanation V (“the playhouse is too small”) modified and furthered this claim and changed the decision on how to develop the outdoor environment of the preschool. Had the authors stopped at III, the quality of their study, according to the definition of quality in this chapter, would have been lower. Similarly, in Example 3, the contradiction in III furthered the development of the meta-inference because it revealed a contradiction between children with high pretest scores and children with intermediate or low pretest scores. Had the researchers stopped at II, they would have found an explanation for the non-occurrence of an effect (“the average child cannot read the textbook”), but not for the difference between children with high pretest scores and those with intermediate or low pretest scores.

In mixed methods research, a contradiction need not necessarily be resolved (Mol, 2002; Uprichard & Dawney, 2019). The identification of a contradiction is important in itself. It furthers a claim by showing that a simple claim, and therefore the phenomenon that this claim describes, is more complex than had initially been thought.

Thus, rather than on the robustness of the meta-inference, the focus of this chapter is on furthering claims. In this approach, claims in mixed methods research may be based on thin evidence. Sometimes they may be interesting ideas for further research rather than robust findings. This does not make these claims less valuable, provided that researchers acknowledge the status of their claims as robust findings, interesting ideas, or somewhere in between. Researchers should not refrain from formulating interesting ideas that arise from their data, even if the evidence is

not robust. The dictum attributed to John Tukey is still true: “An approximate answer to the right problem is worth a good deal more than an exact answer to an approximate problem.”

References

- Assen, J. H. E., Meijers, F., Otting, H., & Poell, R. F. (2016). Explaining discrepancies between teacher beliefs and teacher interventions in a problem-based learning environment: A mixed methods study. *Teaching and Teacher Education, 60*, 12–23. <https://doi.org/10.1016/j.tate.2016.07.022>
- Bazeley, P. (2018). *Integrating analyses in mixed methods research*. Sage.
- Bazeley, P., & Kemp, L. (2012). Mosaics, triangles, and DNA: Metaphors for integrated analysis in mixed methods research. *Journal of Mixed Methods Research, 6*, 55–72. <https://doi.org/10.1177/1558689811419514>
- Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research, 6*, 97–113. <https://doi.org/10.1177/1468794106058877>
- Bryman, A. (2007). Barriers to integrating quantitative and qualitative research. *Journal of Mixed Methods Research, 1*, 8–22. <https://doi.org/10.1177/2345678906290531>
- Cartwright, N. (2018, August). *First mix the claims, then mix the methods*. Keynote address at the international conference of the Mixed Methods Research Association, Vienna, Austria.
- Cartwright, N., & Hardie, J. (2012). *Evidence-based policy: A practical guide to doing it better*. Oxford University Press.
- Clark, A. (2005). Ways of seeing: Using the Mosaic approach to listen to young children’s perspectives. In A. Clark, A. T. Kjørholt, & P. Moss (Eds.), *Beyond listening: Children’s perspectives on early childhood services* (pp. 29–49). Policy Press.
- Creamer, E. G. (2018). *An introduction to fully integrated mixed methods research*. Sage.
- Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage.
- Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs – principles and practices. *Health Services Research, 48*, 2134–2156. <https://doi.org/10.1111/1475-6773.12117>
- Glewwe, P., Kremer, M., & Moulin, S. (2009). Many children left behind? Textbooks and test scores in Kenya. *American Economic Journal: Applied Economics, 1*(1), 112–135. <https://doi.org/10.1257/app.1.1.112>
- González-Ocampo, G., & Castelló, M. (2018). Writing in doctoral programs: Examining supervisors’ perspectives. *Higher Education, 76*, 387–401. <https://doi.org/10.1007/s10734-017-0214-1>
- Greene, J. C. (2007). *Mixed methods in social inquiry*. Jossey-Bass.
- Greene, J. C., Caracelli, V. J., & Graham, W. F. (1989). Toward a conceptual framework for mixed-method evaluation designs. *Educational Evaluation and Policy Analysis, 11*, 255–274. <https://doi.org/10.2307/1163620>
- Greene, J. C., & Hall, J. N. (2010). Dialectics and pragmatism. In A. Tashakkori & C. Teddlie (Eds.), *SAGE handbook of mixed methods in social & behavioral research* (2nd ed., pp. 119–167). Sage.
- Guest, G. (2013). Describing mixed methods research: An alternative to typologies. *Journal of Mixed Methods Research, 7*, 141–151. <https://doi.org/10.1177/1558689812461179>
- Hoffmann, M. (1999). Problems with Peirce’s concept of abduction. *Foundations of Science, 4*, 271–305. <https://doi.org/10.1023/A:1009675824079>
- López, M. G., & Tashakkori, A. (2006). Differential outcomes of two bilingual education programs on English language learners. *Bilingual Research Journal, 30*(1), 123–145. <https://doi.org/10.1080/15235882.2006.10162869>
- Maxwell, J. A., Chmiel, M., & Rogers, S. (2015). Designing integration in mixed method and multi-method research. In S. Hesse-Biber & B. Johnson (Eds.), *The Oxford handbook of multimethod and mixed methods research* (pp. 223–239). Oxford University Press.
- Maxwell, J. A., & Loomis, D. M. (2003). Mixed methods design: An alternative approach. In A. Tashakkori & C. Teddlie (Eds.), *Handbook of mixed methods in social & behavioral research* (pp. 241–271). Sage.
- Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Sage.
- Mol, A. (2002). *The body multiple: Ontology in medical practice*. Duke University Press.
- Morgan, D. L. (2007). Paradigms lost and pragmatism regained: Methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research, 1*, 48–76. <https://doi.org/10.1177/2345678906292462>
- Moseholm, E., & Fetters, M. D. (2017). Conceptual models to guide integration during analysis in convergent mixed methods studies. *Methodological Innovations, 10*(2), 1–11. <https://doi.org/10.1177/2059799117703118>

- O’Cathain, A., Murphy, E., & Nicholl, J. (2010). Three techniques for integrating data in mixed methods studies. *BMJ*, *341*, c4587. <https://doi.org/10.1136/bmj.c4587>
- Ragin, C. C. (1992). Introduction: Cases of “what is a case?” In H. S. Becker & C. C. Ragin (Eds.), *What is a case? Exploring the foundations of social inquiry* (pp. 1–18). Cambridge University Press.
- Schoonenboom, J. (2019). Develop your case! How controversial cases, subcases, and moderated cases can guide you through mixed methods data analysis. *Frontiers in Psychology*, *10*, 1369. <https://doi.org/10.3389/fpsyg.2019.01369>
- Teddlie, C. B., & Tashakkori, A. (2009). *Foundations of mixed methods research: Integrating quantitative and qualitative approaches in the social and behavioral sciences*. Sage.
- Tunarosa, A., & Glynn, M. A. (2017). Strategies of integration in mixed methods research: Insights using relational algorithms. *Organizational Research Methods*, *20*, 224–242. <https://doi.org/10.1177/1094428116637197>
- Uprichard, E., & Dawney, L. (2019). Data diffraction: Challenging data integration in mixed methods research. *Journal of Mixed Methods Research*, *13*, 19–32. <https://doi.org/10.1177/1558689816674650>
- Wheeldon, J. (2010). Mapping mixed methods research: Methods, measures, and meaning. *Journal of Mixed Methods Research*, *4*, 87–102. <https://doi.org/10.1177/1558689809358755>