DESIGNING AND CONDUCTING MIXED-METHOD RESEARCH

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PHILOSOPHICAL APPROACHES AND RESEARCH PARADIGM

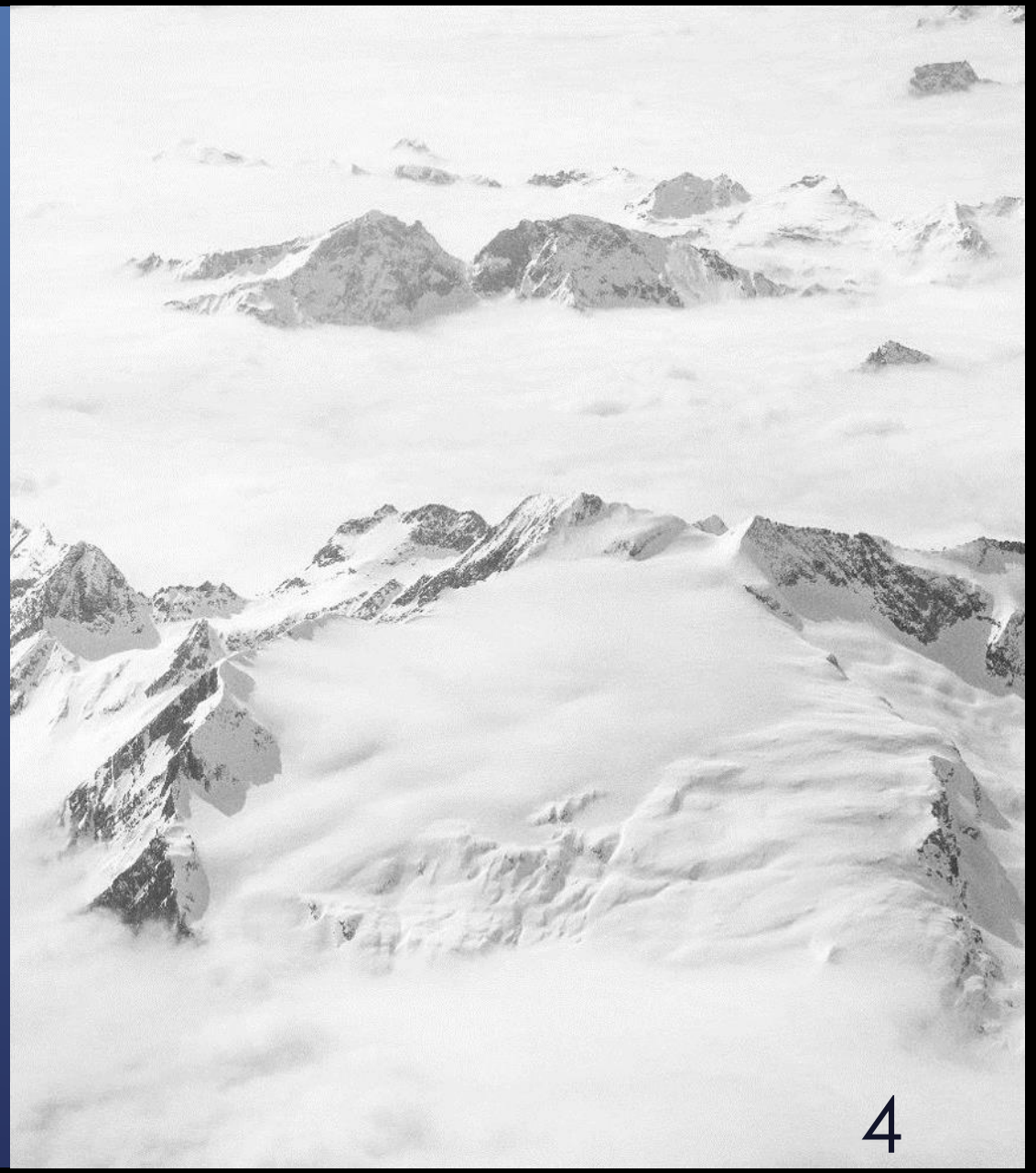
Attribute	Constructivism	Positivism
Epistemology	Knowledge is constructed by individuals through their experiences and interactions.	Knowledge is derived from observable facts and empirical evidence.
Ontology	Reality is subjective and socially constructed.	Reality exists independently of human perception.
Research Approach	Qualitative research methods are often used to explore subjective experiences and meanings.	Quantitative research methods are commonly employed to measure and analyze objective phenomena.
Role of the Researcher	The researcher is an active participant, co-constructing knowledge with participants.	The researcher aims to remain objective and detached from the research process.
Subjectivity	Subjectivity is embraced and valued as it contributes to the understanding of diverse perspectives.	Subjectivity is minimized to ensure objectivity and generalizability of findings.
Validity	Validity is achieved through multiple perspectives and interpretations.	Validity is achieved through rigorous measurement and control of variables.
Change and Progress	Change and progress are seen as ongoing and influenced by social interactions and contexts.	Change and progress are seen as linear and cumulative through the accumulation of knowledge.

PHILOSOPHICAL APPROACHES AND RESEARCH PARADIGM

	Positivist	Interpretivist/ Constructivist	Pragmatic
Ontology *Nature of reality*	Single reality	No single reality	Social real life issues
Epistemology *Nature of knowledge*	Observer is independent of that being researched	Observer is dependent of that being researched	Combination of both
Axiology *Role of the researcher*	Unbiased	Biased	Goal- oriented
Methodology	Quantitative	Qualitative	Mixed Methods
Data Collection	• Experiments • Quasi-experiments • Tests • Scales	• Interviews • Observations • Document reviews • Visual data analysis	• May include tools from both positivist and interpretivist paradigms. Eg Interviews, observations and testing and experiments.

What is Mixed Method Research?

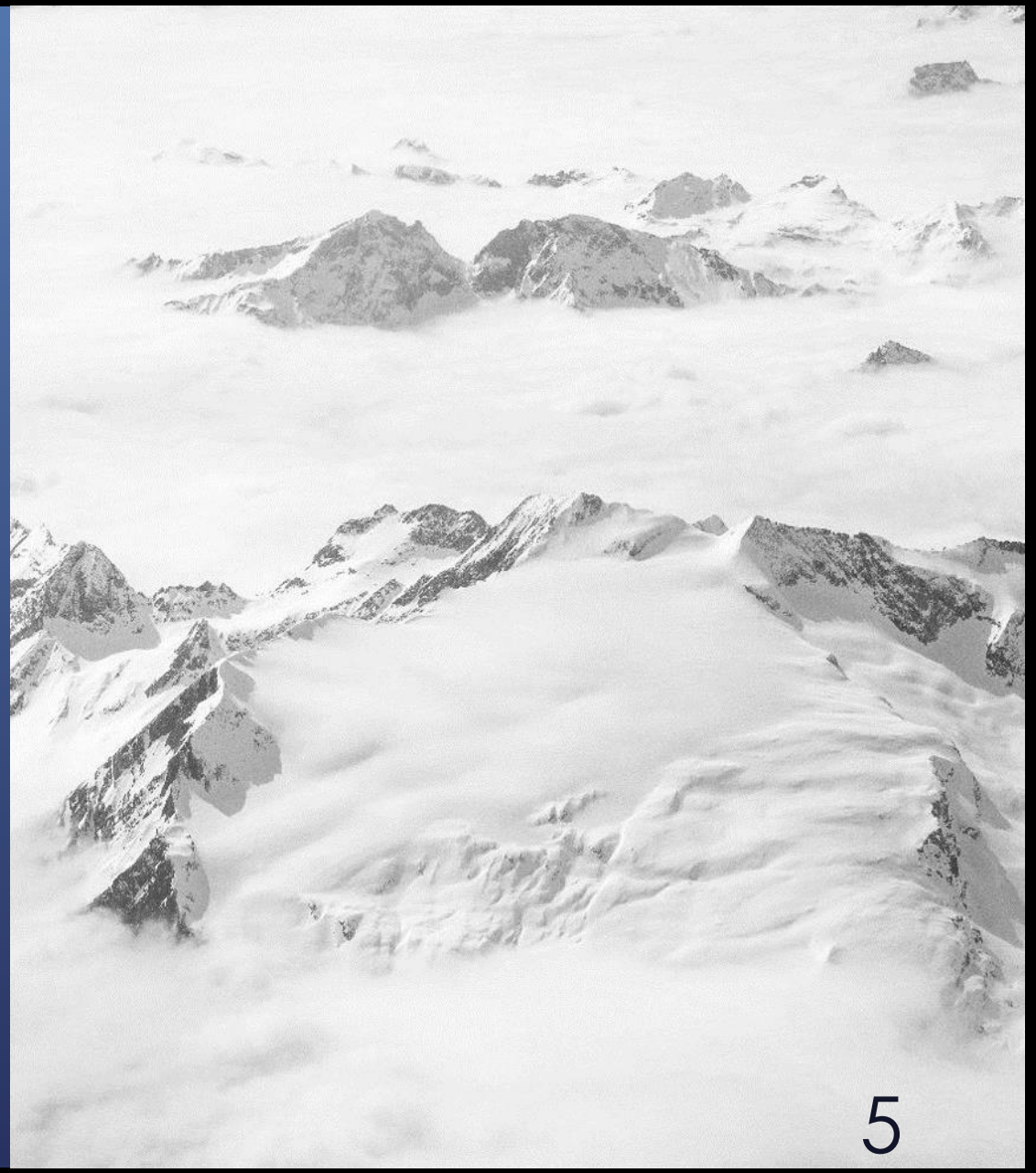
- Combines both quantitative and qualitative approaches to gain comprehensive understanding of the research problem (Johnson, et al. 2007)
- Research in which the investigator collects and analyzes data, integrates the findings, draws inferences using both qualitative and quantitative approaches in a single study or a program of inquiry (Tashakkori & Cresswell, 2007)
- Multiple ways of seeing and hearing, multiple ways of making sense of the social world and multiple standpoints on what is important and to be valued and cherished (Greene, 2007)
- Often used in the behavioral, health and social sciences in multidisciplinary setting and complex situational or societal research



What is Mixed Method Research?

- Goes beyond simply methods – more as methodology that spanned viewpoints to inferences
- Defines in terms of characteristics
  - Collects and analyzes both qualitative and quantitative data rigorously in response to research questions and hypotheses
  - Integrates the two forms of data and their results
  - Organizes these procedures into specific research designs that provide the logic and procedures for conducting the study
  - Frames these procedures within theory and philosophy

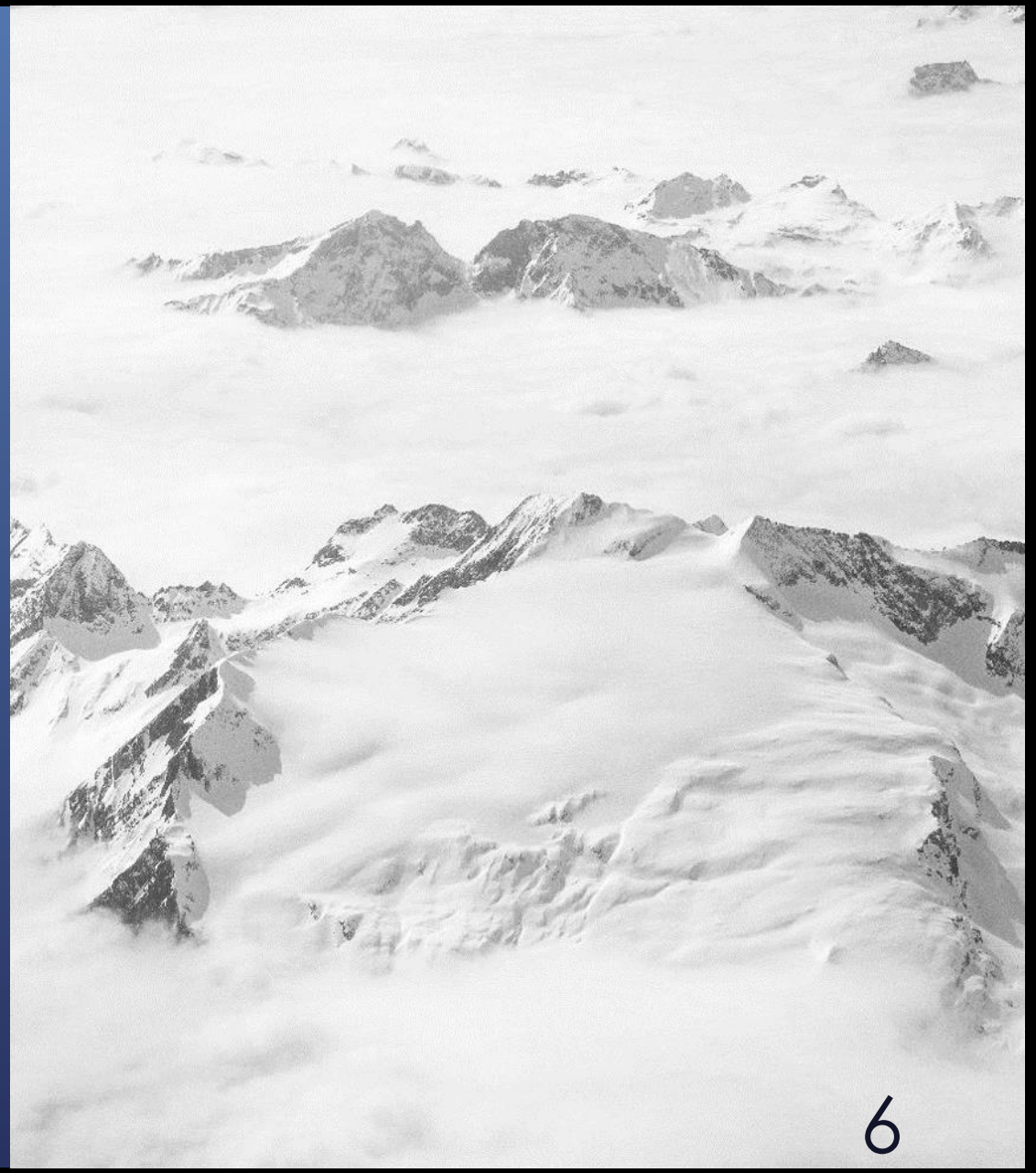
(Cresswell & Clark, 2018)



Rationales for Performing Mixed Method Research

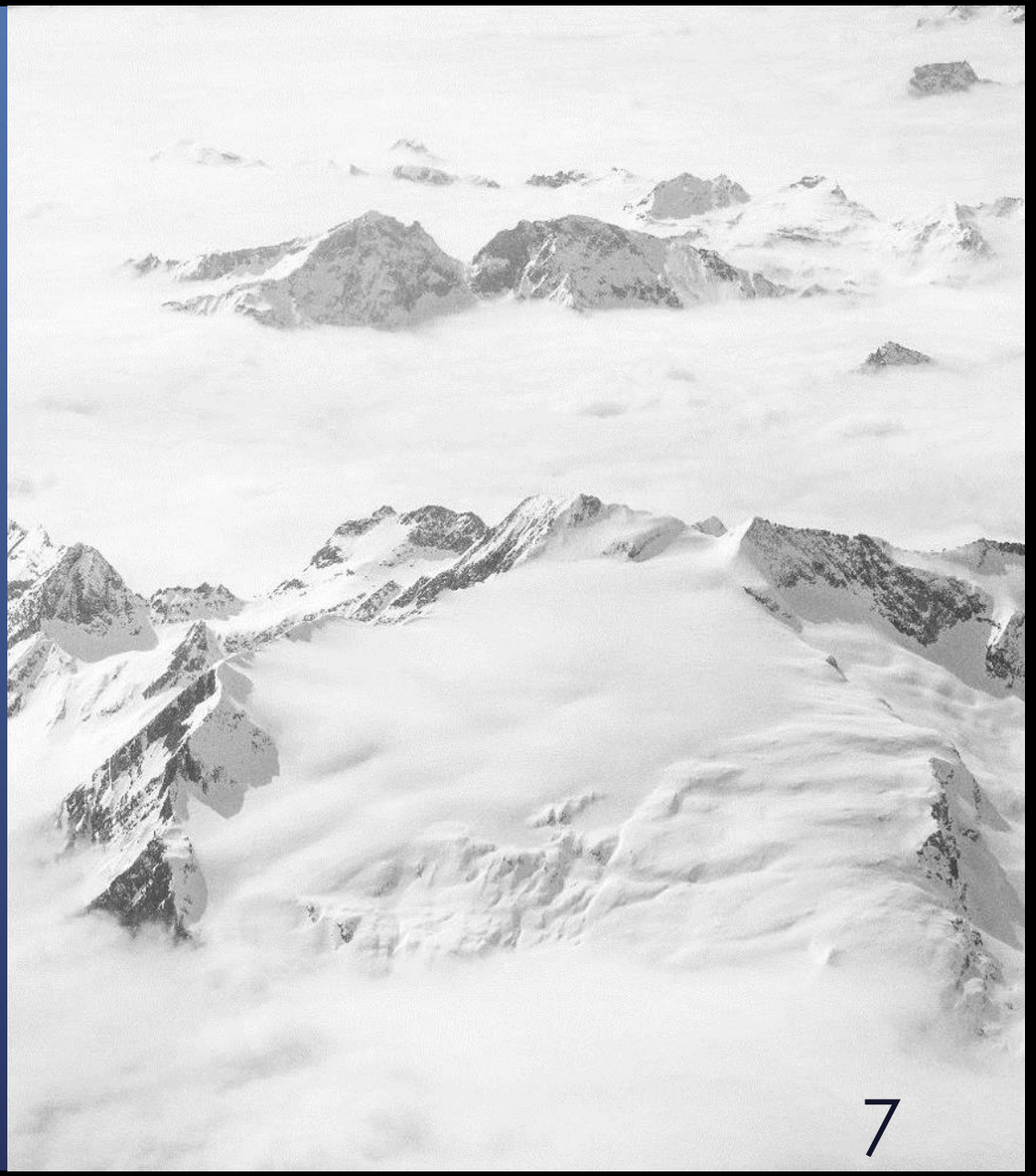
- Generalizability
- Contextualization
- Credibility
- Utility - improving usefulness of findings
- Confirm and discover

  (Bryman's 2006)



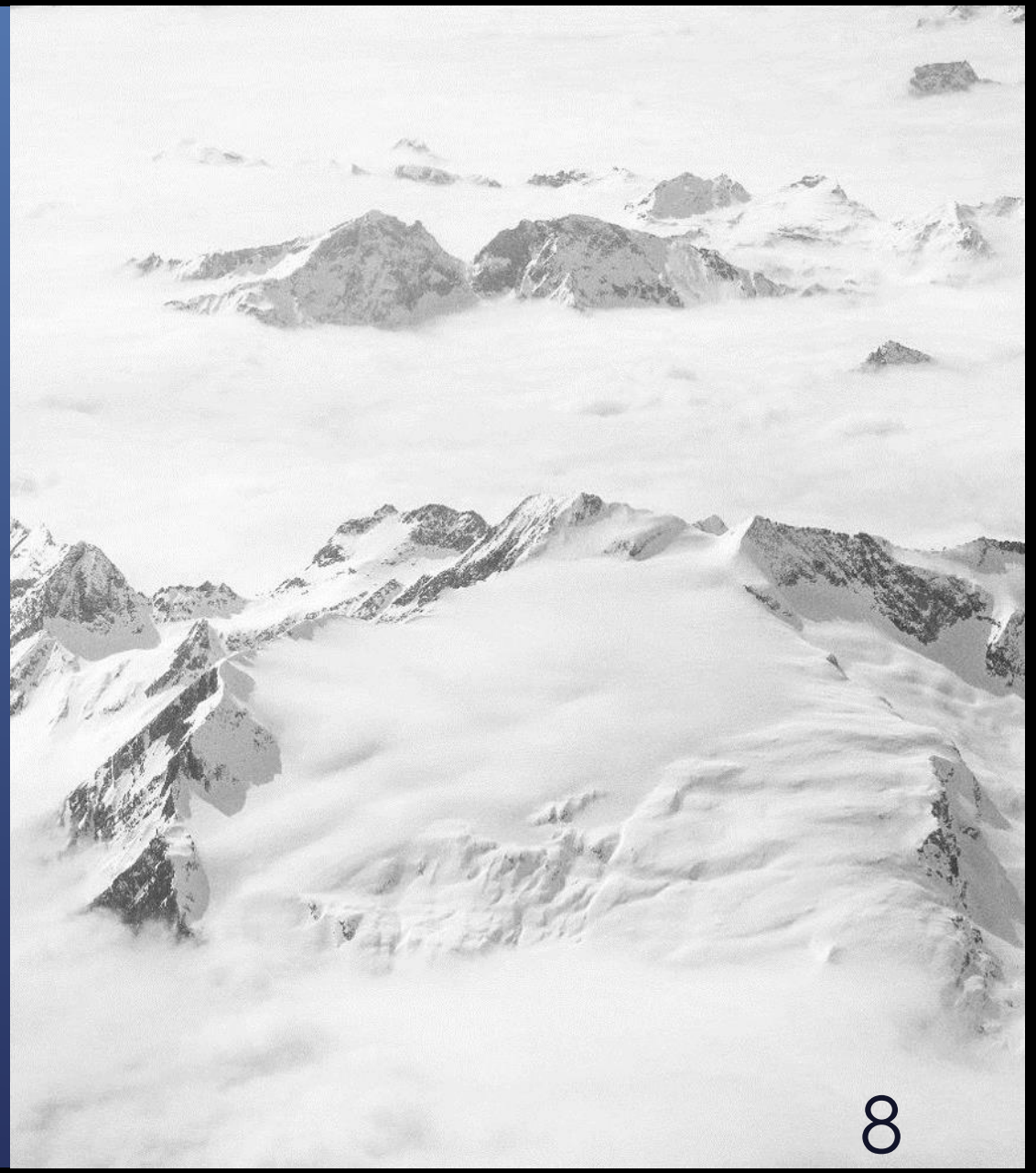
Research Example

- You want to research **cycling safety in high-traffic areas of Amsterdam**. If you're interested in the frequency of accidents and where they occur, this could be a straightforward quantitative analysis. If you're interested in the nature of complaints submitted by cyclists, or their perceptions about cycling in particular areas, then a qualitative approach may fit best.
- But mixed methods might be a good choice if you want to meaningfully integrate both of these questions in one research study.
- For example, you could use a mixed methods design to investigate whether areas perceived as dangerous have high accident rates, or to explore why specific areas are more dangerous for cyclists than others.



Examples of Mixed Method Research Questions

- To what extent does the frequency of traffic accidents reflect cyclist perceptions of road safety in Amsterdam?
- How do student perceptions of their school environment relate to differences in test scores?
- How do perceptions about job satisfaction at company ABC help explain annual sales performance and other KPIs?
- How can voter and non-voter beliefs about democracy help explain election turnout patterns in Town X?
- How do average hospital salary measurements over time help to explain nurse testimonials about job satisfaction?

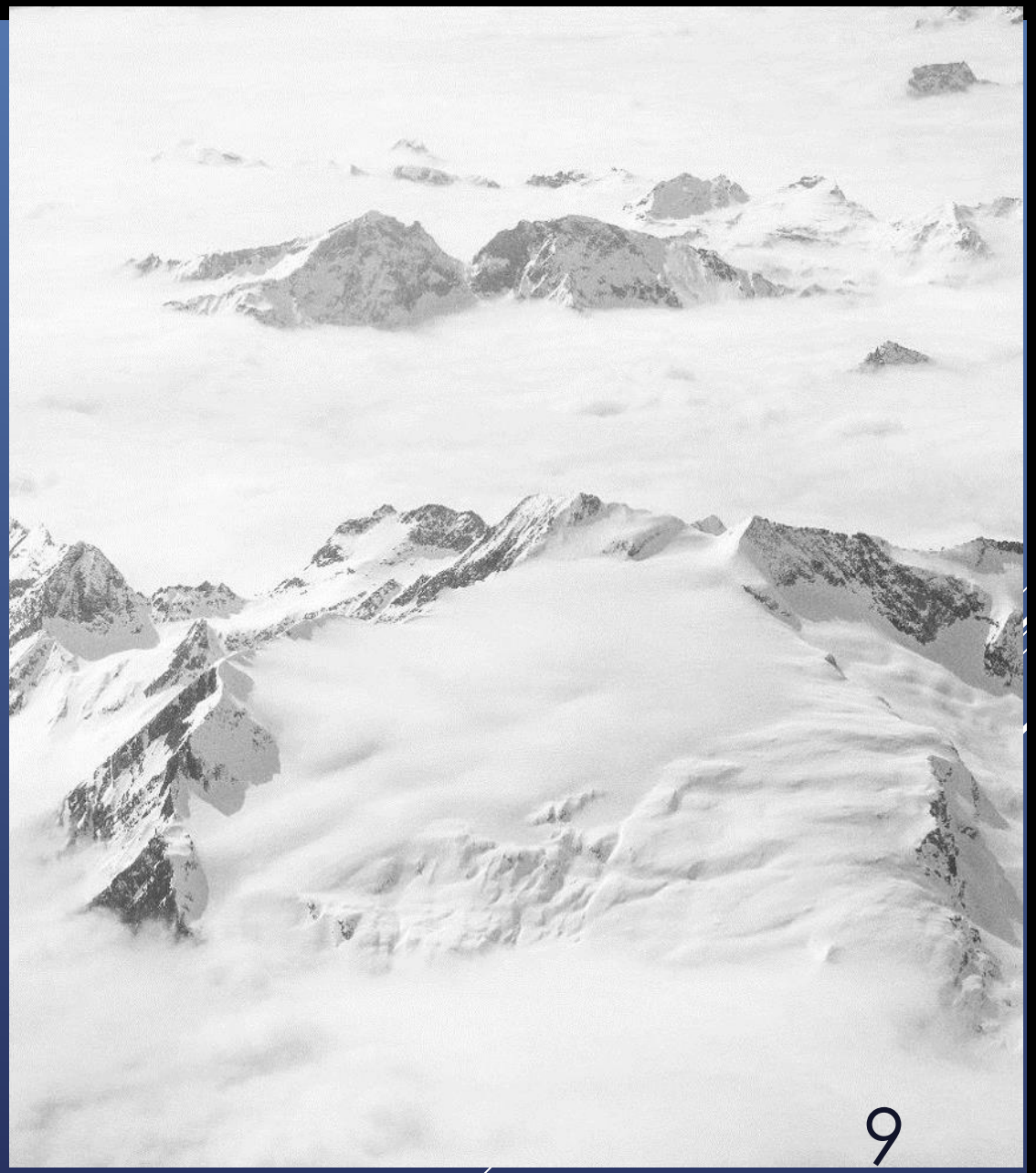


Mixed Method Research Design

Depends on:

- Research aim/purpose
  - Triangulation – seeks convergence, corroboration, correspondence of results from different methods
  - Complementarity – seeks elaboration, enhancement, illustration, clarification of the results from one method with the results from the other method
  - Development – seeks to use the results from one method to help develop or inform the other method
  - Initiation – seeks the discovery of paradox and contradiction, new perspective of frameworks, recasting of questions from one method with questions or results from other method
  - Expansion – seeks to extend the breadth and range of inquiry by using different methods for different inquiry components

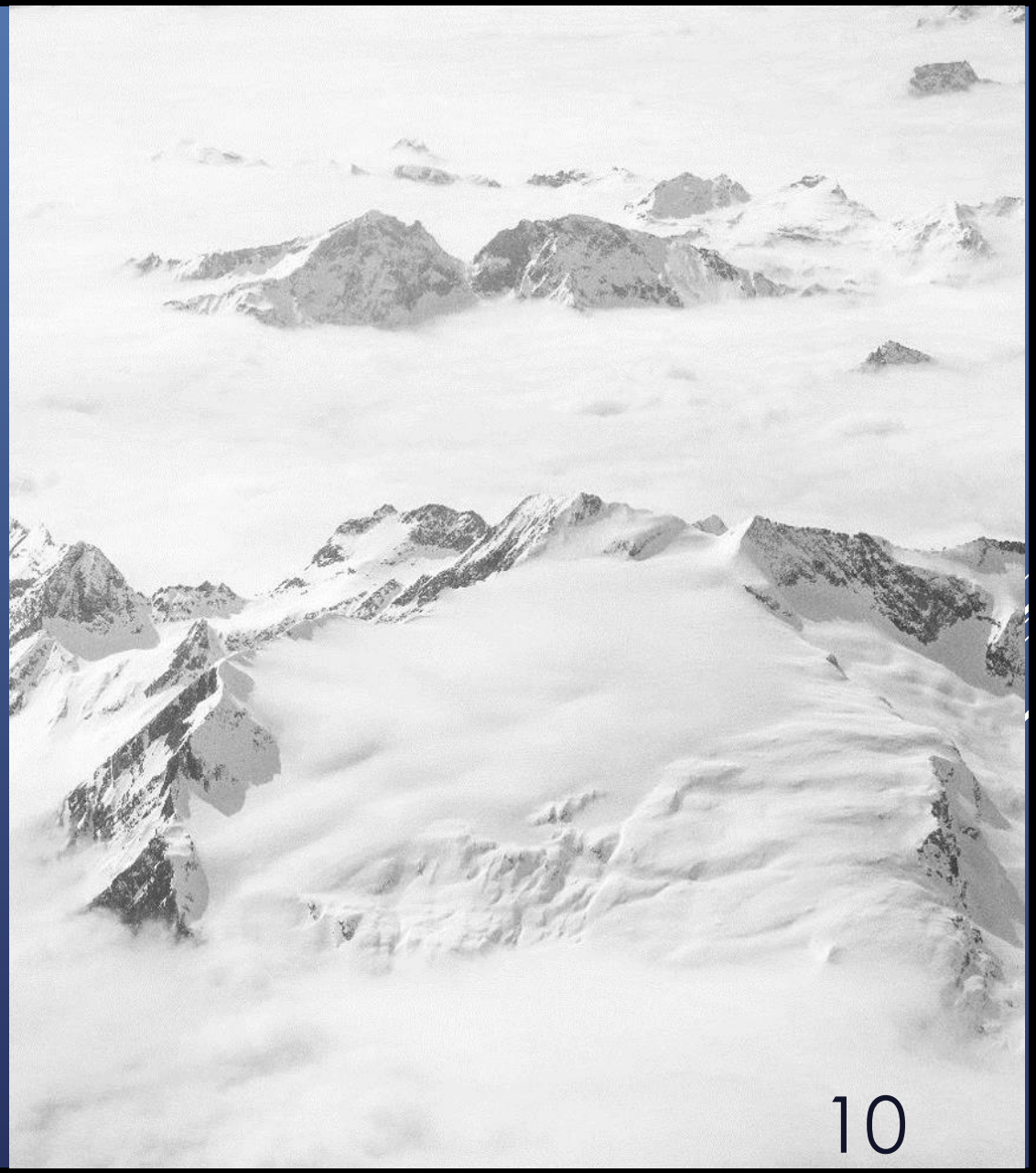
(Green et al., 1989)



Mixed Method Research Design – cont.

Depends on:

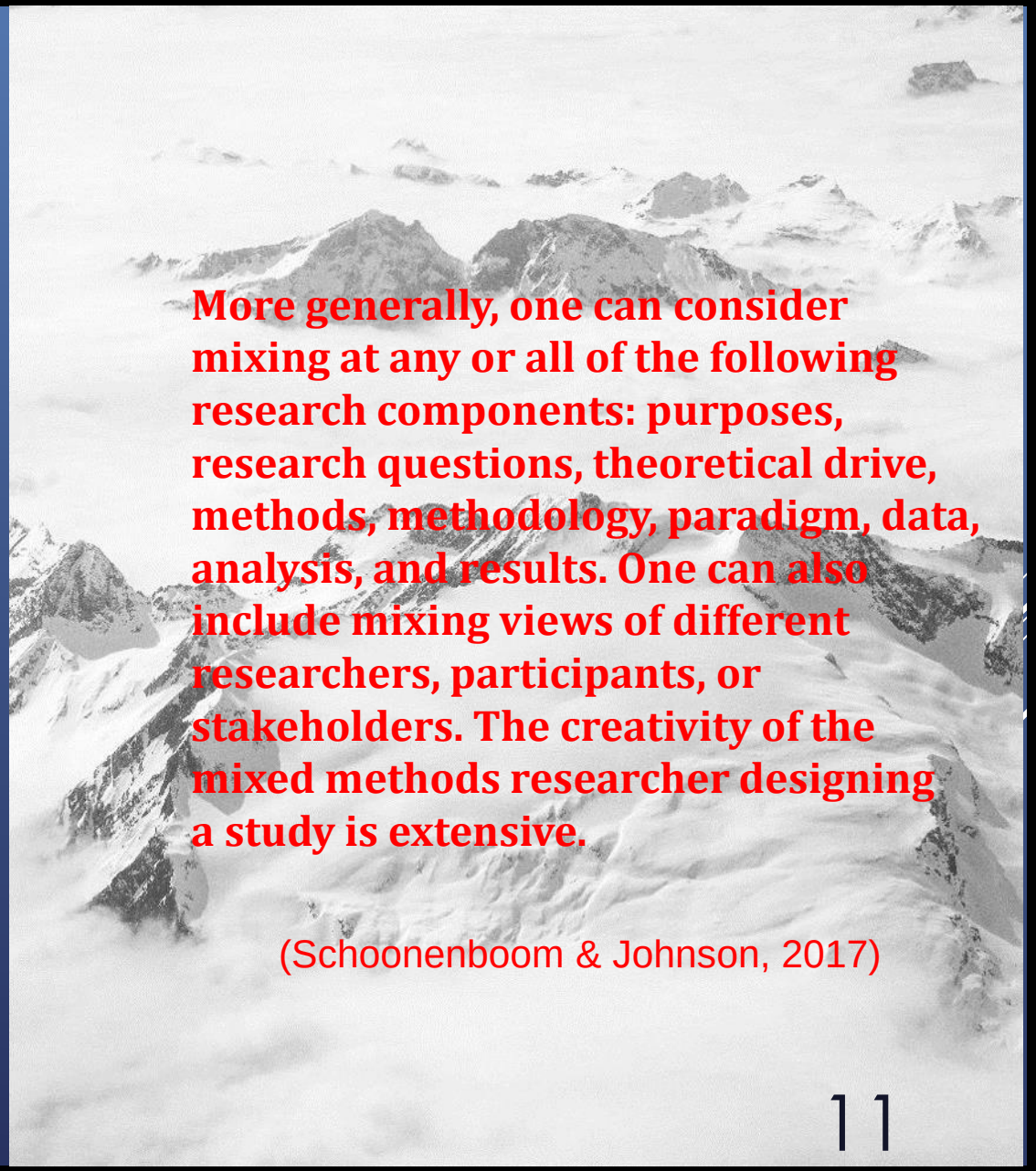
- Theoretical drive (Johnson et al., 2007)
  - Qualitatively driven – relies on qualitative while concurrently recognizing the addition of quantitative data and approaches to the research project
  - Quantitatively driven - relies on a quantitative, post-positivist view of the research process, while concurrently recognizing that the addition of qualitative data and approaches are likely to benefit most research projects
  - Interactive mixed method – equal status
- Timing of data collection
  - concurrent vs. sequential (Guest, 2013)



Mixed Method Research Design – cont.

Depends on:

- Timing of data collection - dependence
- Point of integration – the point at which qualitative and quantitative components are brought together
  - Results point of integration
  - Analytical point of integration (Morse & Niehaus, 2009)
  - Instrument development – use of interview to develop survey instrument
  - Development of the sample – selecting interview participants on the basis of the results of the survey (Teddlie & Tashakkori, 2009)



More generally, one can consider mixing at any or all of the following research components: purposes, research questions, theoretical drive, methods, methodology, paradigm, data, analysis, and results. One can also include mixing views of different researchers, participants, or stakeholders. The creativity of the mixed methods researcher designing a study is extensive.

(Schoonenboom & Johnson, 2017)

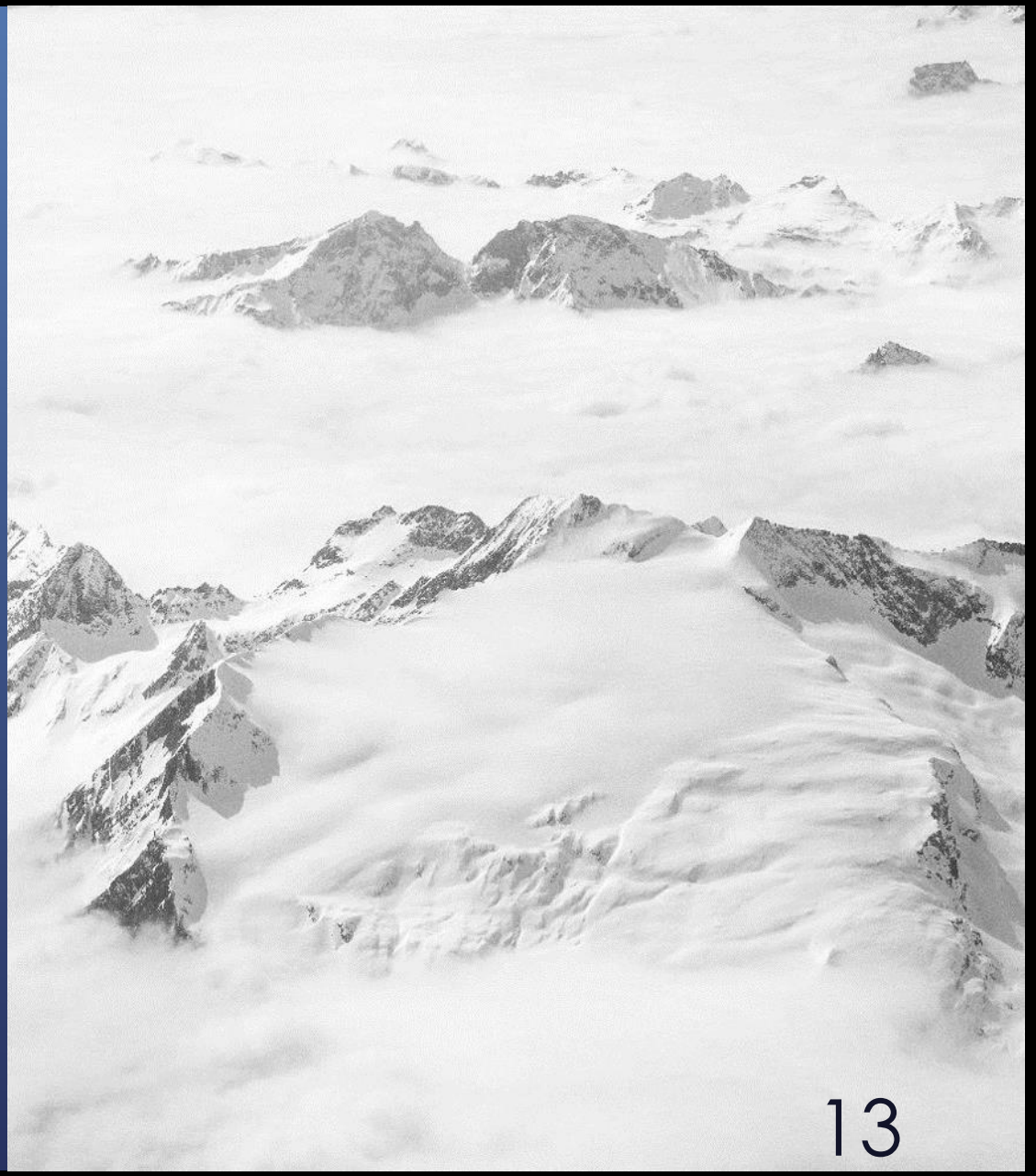
Mixed Method Research Design – cont.

- Convergent parallel
- Embedded
- Explanatory sequential
- Exploratory sequential

(Green, 2007)

- Conversion mixed design – mixing occurs when one type data is transformed to the other type and then analyzed; the additional findings are added to the results
- Multilevel mixed designs – mixing occurs across multiple levels of analysis – data are analyzed and integrated to answer related aspects of the same research question
- Fully integrated mixed design – mixing occurs in an interactive manner at all stages of study

(Teddlie & Tashakkori, 2009)



EXAMPLES OF MIXED METHOD RESEARCH DESIGN

Convergent Undertake both sides of research simultaneously: •On the qualitative side, you analyze cyclist complaints via the city's database and on social media to find out which areas are perceived as dangerous and why. •On the quantitative side, you analyze accident reports in the city's database to find out how frequently accidents occur in different areas of the city. When you finish your data collection and analysis, you then compare results and tie your findings together.	**Embed** As part of a quantitative study testing whether the number of cyclist complaints about an area correlates with the number of accidents, you could "embed" a series of qualitative interviews with cyclists who submitted complaints to further strengthen your argument. The bulk of your research remains quantitative.
Explanatory You analyze the accident statistics first and draw preliminary conclusions about which areas are most dangerous. Based on these findings, you conduct interviews with cyclists in high-accident areas and analyze complaints qualitatively. You can utilize the qualitative data to explain why accidents occur on specific roads, and take a deep dive into particular problem areas.	**Exploratory** You first interview cyclists to develop an initial understanding of problem areas, and draw preliminary conclusions. Then you analyze accident statistics to test whether cyclist perceptions line up with where accidents occur.

Characteristics of the Major Mixed Method Designs

Prototypical Characteristics	Convergent Design	Explanatory Design	Exploratory Design	Embedded Design
Definition	• Concurrent quantitative and qualitative data collection, separate quantitative and qualitative analyses, and the merging of the two data sets	• Methods implemented sequentially, starting with quantitative data collection and analysis in Phase 1 followed by qualitative data collection and analysis in Phase 2, which builds on Phase 1	• Methods implemented sequentially, starting with qualitative data collection and analysis in Phase 1 followed by quantitative data collection and analysis in Phase 2, which builds on Phase 1	• Either the concurrent or sequential collection of supporting data with separate data analysis and the use of the supporting data before, during, or after the major data collection procedures
Design purpose	• Need a more complete understanding of a topic • Need to validate or corroborate quantitative scales	• Need to explain quantitative results	• Need to test or measure qualitative exploratory findings	• Need preliminary exploration before an experimental trial (sequential/before) • Need a more complete understanding of an experimental trial, such as the process and outcomes (concurrent/during) • Need follow-up explanations after an experimental trial (sequential/after)

Prototypical Characteristics	Convergent Design	Explanatory Design	Exploratory Design	Embedded Design
Typical paradigm foundation	• Pragmatism as an umbrella philosophy	• Postpositivist in Phase 1 • Constructivist in Phase 2	• Constructivist in Phase 1 • Postpositivist in Phase 2	• Worldview may reflect the primary approach (e.g., postpositivist or constructivist) or pragmatism if concurrent • Constructivist for the qualitative component and postpositivist for the quantitative component if sequential
Level of interaction	Independent	Interactive	Interactive	Interactive
Priority of the strands	Equal emphasis	Quantitative emphasis	Qualitative emphasis	Either quantitative or qualitative emphasis
Timing of the strands	Concurrent	Sequential: quantitative first	Sequential: qualitative first	Either concurrent or sequential
Primary point of interface for mixing	• Interpretation if independent • Analysis if interactive	• Data collection	• Data collection	• Design level

Cresswell & Clark, 2017)

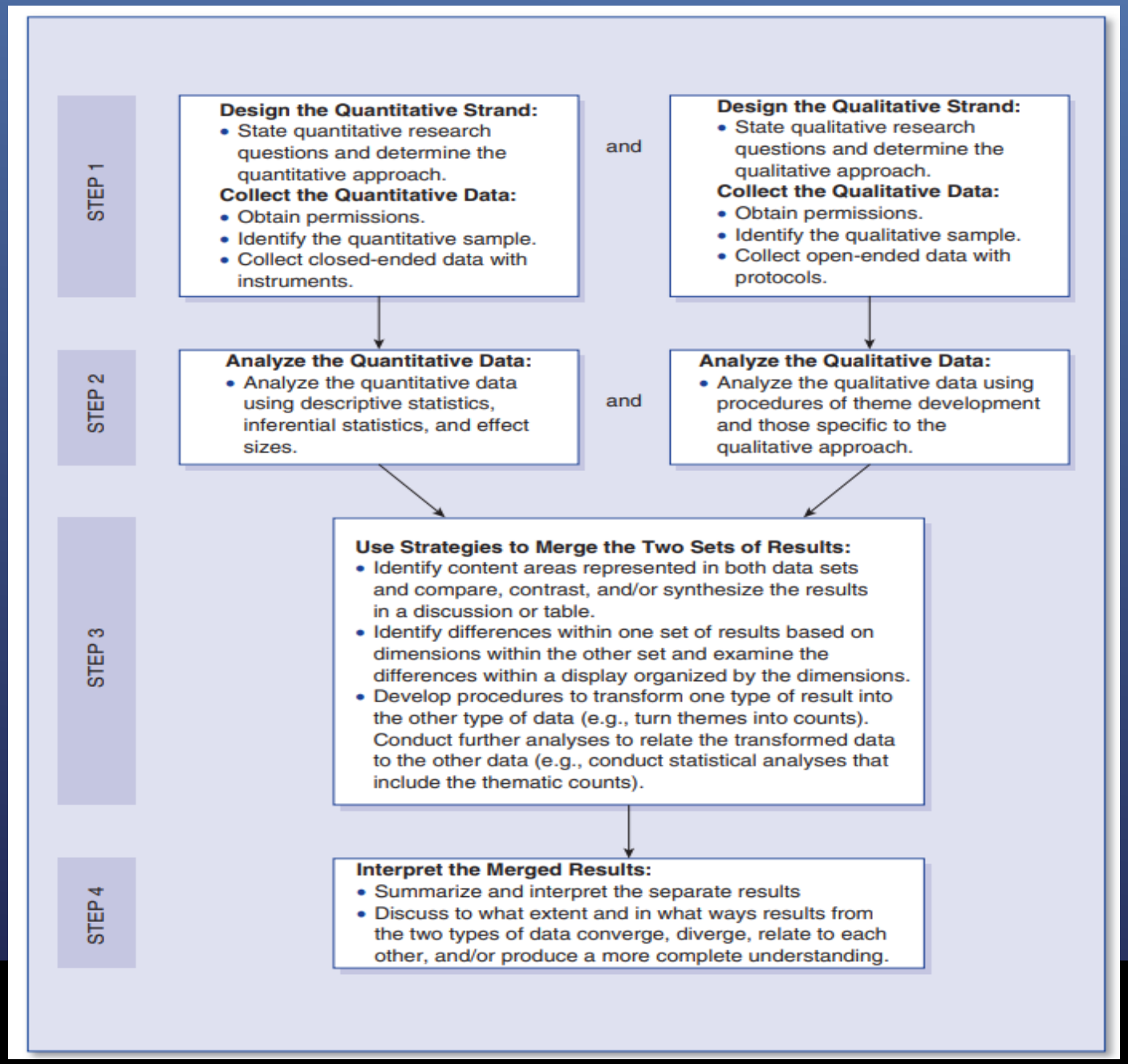
Characteristics of the Major Mixed Method Designs

Prototypical Characteristics	Convergent Design	Explanatory Design	Exploratory Design	Embedded Design
Primary mixing strategies	Merging the two strands: • After separate data analysis • With further analyses (e.g., comparisons or transformations) of separate results	Connecting the two strands: • From quantitative data analysis to qualitative data collection • Use quantitative results to make decisions about qualitative research questions, sampling, and data collection in Phase 2	Connecting the two strands: • From qualitative data analysis to quantitative data collection • Use qualitative results to make decisions about quantitative research questions, sampling, and data collection in Phase 2	Embedding one strand within a design based on the other type: • Before, during, or after major component • Use secondary results to enhance planning, understanding, or explaining of primary strand

Prototypical Characteristics	Convergent Design	Explanatory Design	Exploratory Design	Embedded Design
Common variants	• Parallel databases • Data transformation • Data validation	• Follow-up explanations • Participant selection	• Theory development • Instrument development	• Embedded experiment • Embedded correlational design • Mixed methods case study • Mixed methods narrative research • Mixed methods ethnography

Cresswell & Clark, 2017)

Flowchart of Basic Procedures in Implementing Convergent Design



Strengths :

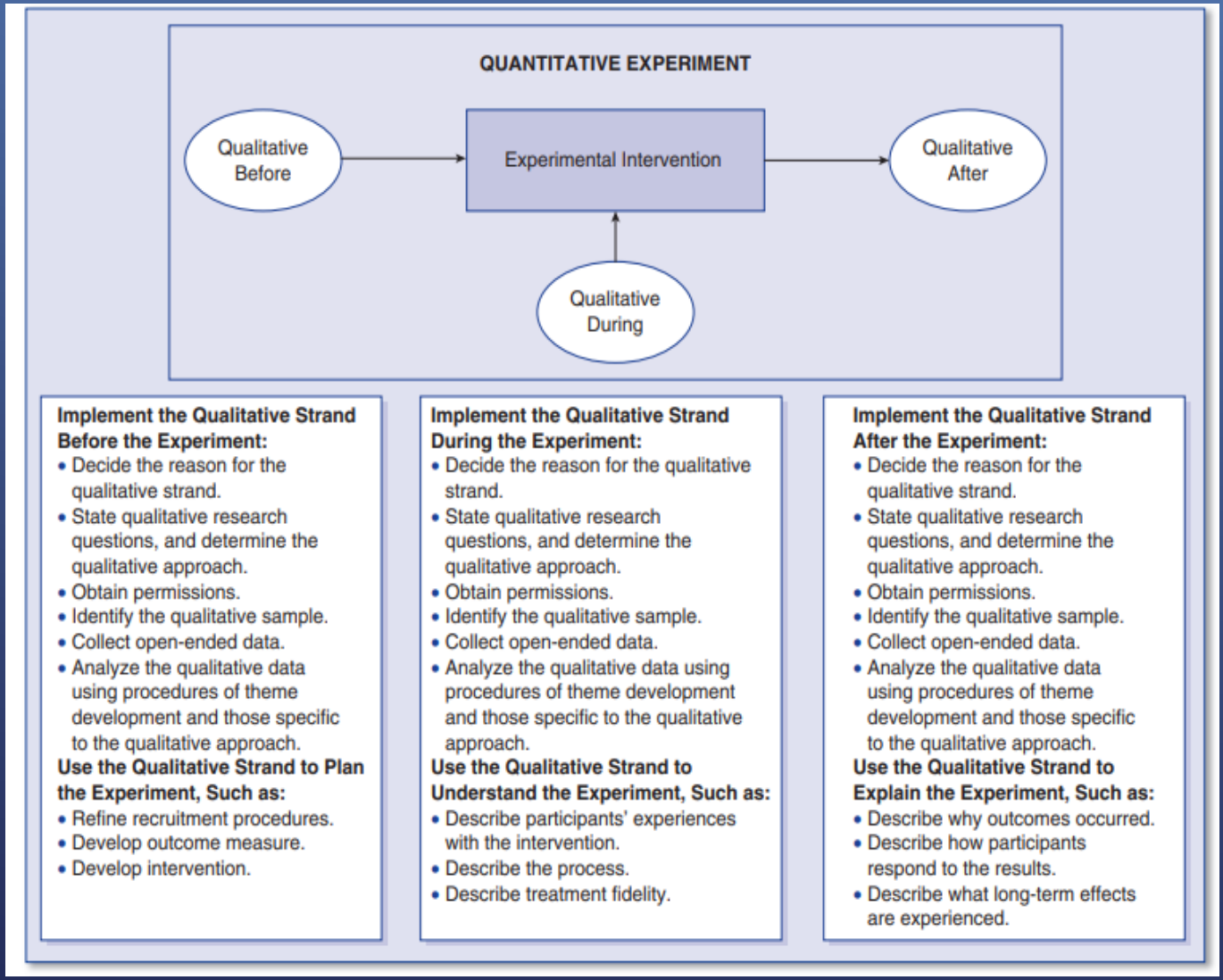
- Efficient design – data collected at one phase of research
- Each type of data can be collected and analysed separately and independently

Challenges:

- Much effort and expertise is required due to concurrent data collection and equal weight
- Need to consider consequences of having different samples and different sample size when merging data sets
- May face the issue of contradicting results

Cresswell & Clark, 2017)

Flowchart of Basic Procedures in Implementing Embedded Design



Strengths :

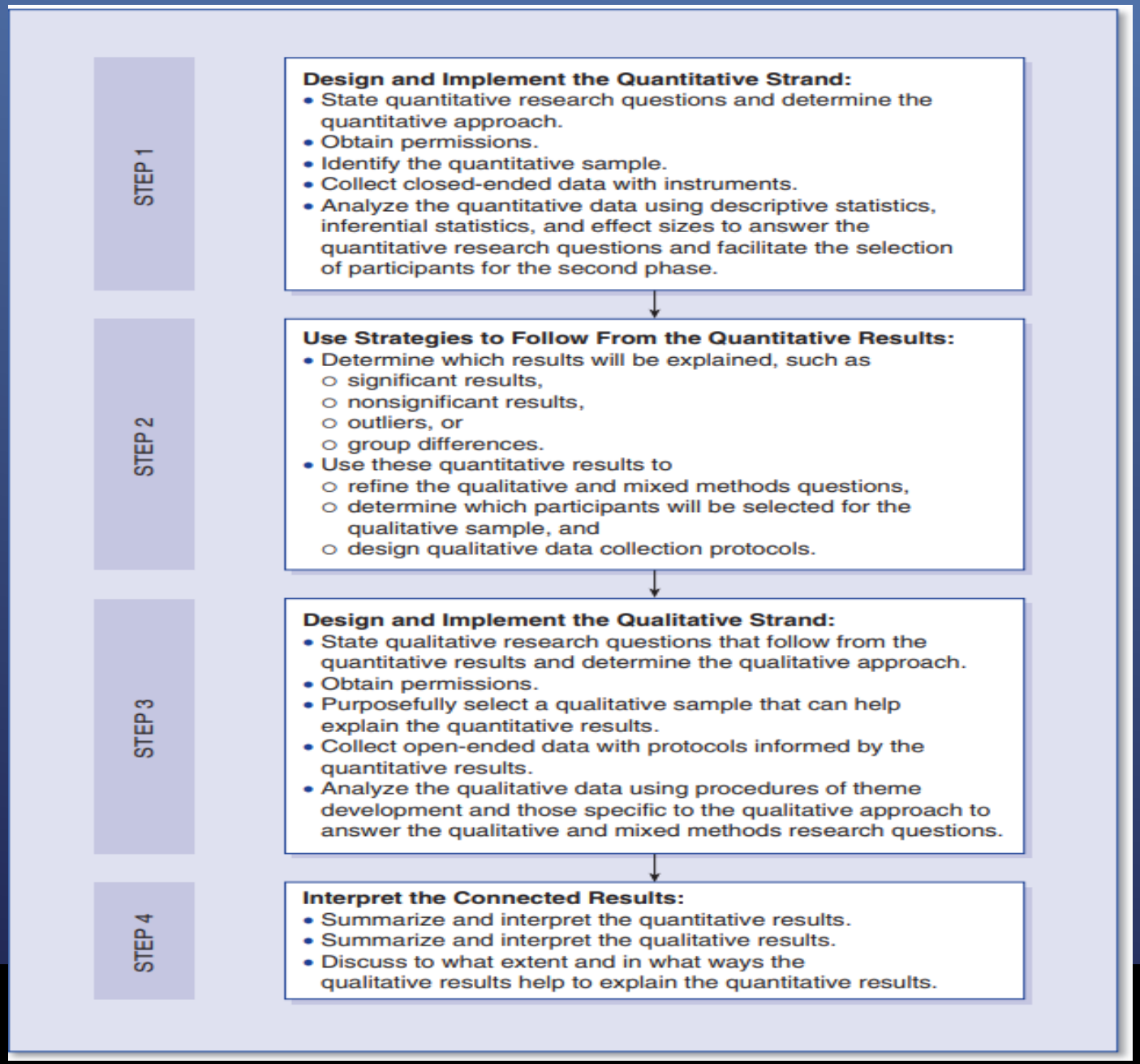
- Useful when researcher does not have sufficient time or resources to commit to extensive quantitative and qualitative data collection because one data type is given less priority than the other
- By the addition of supplemental data, the researcher is able to improve the larger design
- Different methods are addressing different questions, so can focus

Challenges:

- The researcher must decide at what point in the experimental study to collect the qualitative data in relation to the intervention (i.e., before, during, after, or some combination).

Cresswell & Clark, 2017)

Flowchart of Basic Procedures in Implementing Explanatory Design



Strengths :

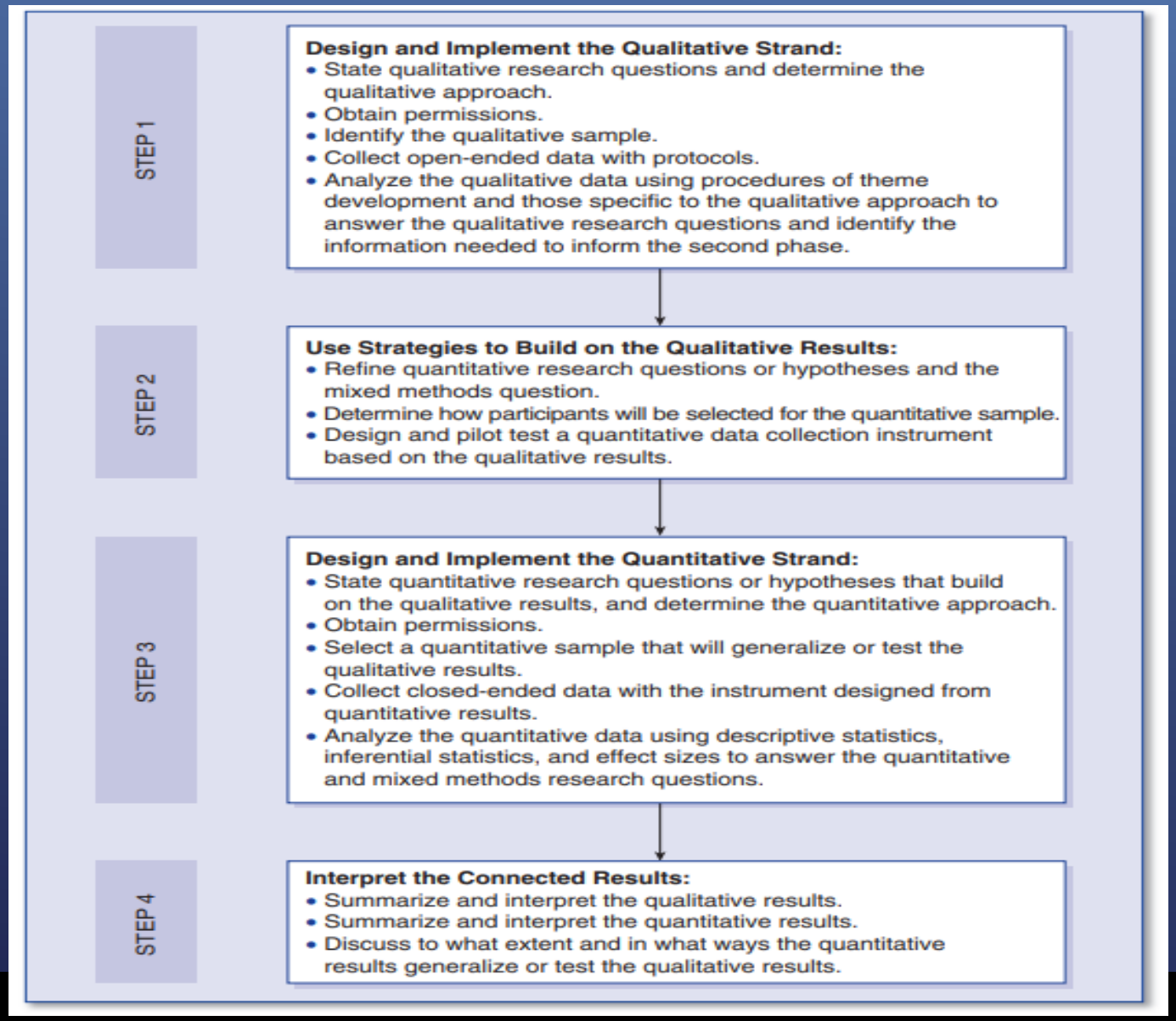
- Straight-forward to implement – 2-phases
- Reports can be written by section
- Lend itself to emergent approaches

Challenges:

- Lengthy amount of time
- Need to decide which quantitative results need to be further explained
- Sampling and how to do sample selection

Cresswell & Clark, 2017)

Flowchart of Basic Procedures in Implementing Exploratory Design



Strengths :

- Separate phases make the exploratory design straightforward to describe, implement, and report
- The researcher can produce a new instrument as one of the potential products of the research process.

Challenges:

- The two-phase approach requires considerable time to implement
- Researchers should consider using a small purposeful sample in the first phase and a large sample of different participants in the second phase to avoid questions of bias in the quantitative strand
- Procedures should be undertaken to ensure that the scores developed on the instrument are valid and reliable

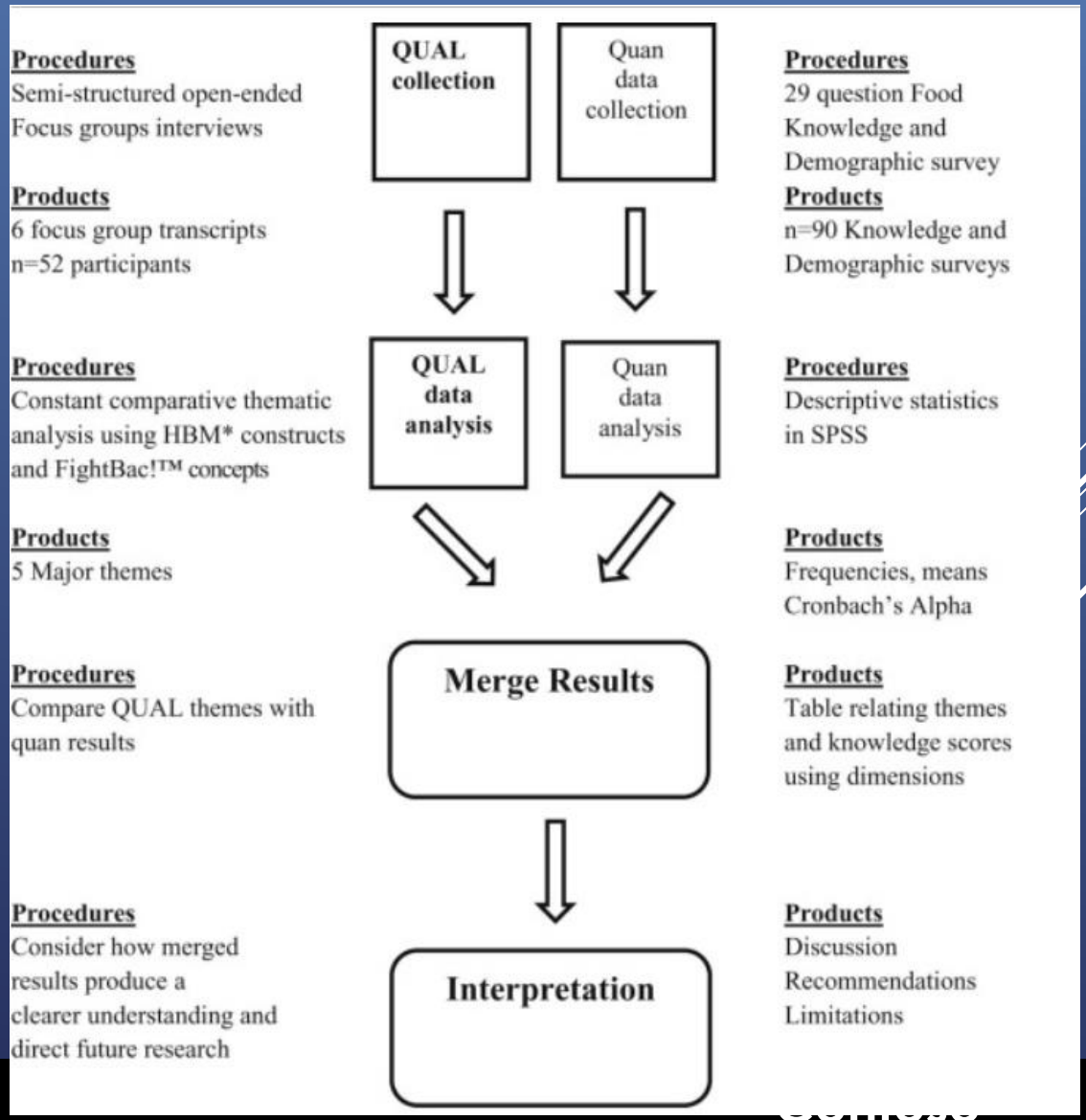
Cresswell & Clark, 2017)

Contoso Suites

EXAMPLES OF MIXED METHOD STUDIES

A Mixed Method Study of Food Safety Knowledge, Practices and Beliefs and Hispanic Families with Young Children (Stenger et al., 2014)

Reducing the incidence of foodborne illness among Hispanic families may increase quality of life, decrease morbidity, mortality, and resources needed to treat the illness. The purpose of this mixed methods study was to examine food safety among main food preparers in Hispanic families with young children in a Midwestern State. Qualitative inquiry explored the presence of food safety practices, attitudes, and cultural beliefs among primary food handlers. A quantitative survey measured food safety knowledge. The extent that food safety knowledge supported or diverged from food safety practices, attitudes and cultural beliefs reported by Hispanic families with young children was observed.



Suites

EXAMPLES OF MIXED METHOD STUDIES

Fear of Falling and Changed Functional Ability Following Hip Fracture among Community-Dwelling Elderly People: An Explanatory Sequential Mixed Method Study (Jellesmark et al., 2012)

Purpose: The aims of the study were to assess self-reported fear of falling (FOF) and functional ability among community-dwelling elderly people 3–6 months post hospital discharge after a hip fracture, to investigate the association between FOF and functional ability, and to explore the lived experience of FOF and disability when recovering from a hip fracture. *Method*: A sequential explanatory mixed method design was used in a "face-to-face" survey assessing FOF (Falls Efficacy Scale-International, FES-I), avoidance of activities (Modified survey of Activities and Fear of Falling, mSAFFE), functional ability (Functional Recovery Score, FRS), and mobility (New Mobility Score, NMS) followed by in-depth interviews of four participants. Interviews were analyzed using systematic text condensation. *Results:* Among the 33 participants 58% had a high degree of FOF and avoided more activities, needed more assistance in activities of daily living, and were less mobile than participants who had a low degree of FOF ($p < 0.0001$). According to the informants FOF reduced their functional ability and seriously altered their lives. *Conclusions*: FOF was common and significantly associated with activity avoidance, disability, and affected the lives of elderly recovering from a hip fracture. Some patients were physically incapacitated by FOF.

EXAMPLES OF MIXED METHOD STUDIES

Using the Exploratory Sequential Mixed Methods Design to Investigate Dental Patients' Perceptions and Needs Concerning Oral Cancer Information, Examination, Prevention and Behavior (Jafer et al., 2021)

Abstract

Objectives: The objective of this study was to investigate dental patients' behavior, thoughts, opinions and needs for oral cancer information, and dentists' behavior regarding prevention and examination of oral cancer. Materials and Methods: This study utilized an exploratory sequential mixed methods design. Semi-structured interviews with open-ended questions were conducted for forty dental patients of both sexes. Based on the qualitative analysis, a structured questionnaire was developed and distributed among the participants. Data were analyzed for 315 participants to quantify their thoughts, needs, behavior and behavior expected from dentists regarding oral cancer. Frequency, percentages and cumulative percentages were calculated. Results: This study reveals that patients' oral cancer knowledge levels were adequate, but most reported that their dentist had never examined them for oral cancer. Additionally, the participants had never performed self-examinations for oral cancer, nor were they aware of the possibility of doing so. Participants showed a preference for being examined and educated by their dentist about oral cancer and believed it would help early detection. Conclusions: The study participants are aware of oral cancer and its risk factors. The practice of oral cancer examinations and patient education of its risk factors by dental practitioners is limited. Patients feel a need for more attention to be paid to oral cancer examinations, preventive measures and targeted information on oral cancer risk factors.

Keywords: **early detection**; **mixed methods design**; **oral cancer**; **patient education**; **qualitative study**; **risk factors**

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EXAMPLES OF MIXED METHOD STUDIES

Transition to a new nursing information system embedded with clinical decision support: a mixed-method study using the HOT-fit framework (Yue et al., 2022)

Background

Nursing information systems embedded with standardized nursing language and clinical decision support have been increasingly introduced in health care settings. User experience is key to the adoption of health information technologies. Despite extensive research into the user experience with nursing information systems, few studies have focused on the interaction between user, technology and organizational attributes during its implementation. Guided by the human, organization and technology-fit framework, this study aimed to investigate nurses' perceptions and experiences with transition to a new nursing information system (Care Direct) 2 years after its first introduction.

Methods

This is a mixed-method study using an embedded design. An online survey was launched to collect nurses' self-reported use of the new system, perceived system effectiveness and experience of participation in system optimization. Twenty-two semi structured interviews were conducted with twenty nurses with clinical or administrative roles. The quantitative and qualitative data were merged using the Pillar Integration Process.

Sampling for Convergent Design

Quantitative Data (random sampling/non-random sampling)

- Same database, same size
- Same database, unequal size

Qualitative Data (purposive sampling)

Merged or integrated data

https://youtu.be/tlFRTQpZi1s?si=KElOmSs6FCcEyk0S

Sampling for Explanatory Sequential Design

Quantitative Data (random sampling/non-random sampling)

- Same sample, unequal size
- Ask for volunteers

Qualitative Data (purposive sampling)

Qualitative findings help explain quantitative findings

https://youtu.be/tlFRTQpZi1s?si=KElOmSs6FCcEyk0S

Sampling for Exploratory Sequential Design

Qualitative Data (purposive sampling) → Quantitative component: instrument → Quantitative Data (random/non-random sampling)

- Same sample, unequal size

Quantitative findings help to generalize to a larger sample; to provide validity to instrument

https://youtu.be/tlFRTQpZi1s?si=KElOmSs6FCcEyk0S

Sampling for Embedded Sequential Design

Qualitative exploratory data (purposeful sampling)

- Experimental study with pre- and post test with multiple groups

Qualitative Data exploratory data (purposeful sampling)

https://youtu.be/tlFRTQpZi1s?si=KElOmSs6FCcEyk0S

Integration Side-by-Side in a Joint Display Table

Questions Asked	Qualitative Themes	Quantitative Statistical Results	Difference between themes and Statistical results
Where does smoking occur?	After school In car	80% smokers engage after school	Consistent results

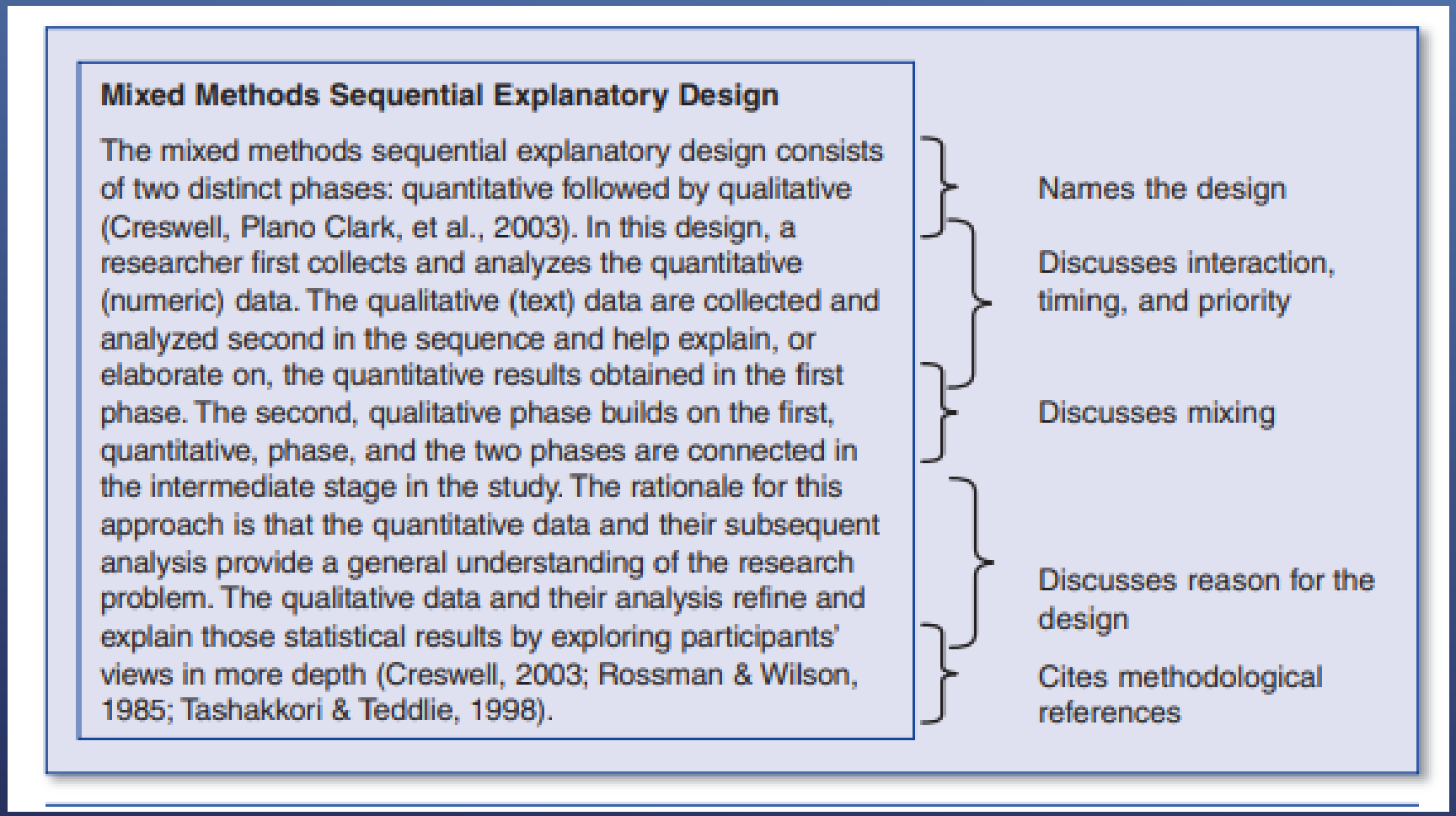
https://youtu.be/tlFRTQpZi1s?si=KElOmSs6FCcEyk0S

Integration Side-by-Side in a Joint Display Table

Quantitative results	Qualitative follow-up interviews	How qualitative findings help explain quantitative results
The more experience the teachers, and the use of program materials, the higher the score	How and why experienced were willing to use the program materials	Motivations and willingness surface on the explanation

https://youtu.be/tlFRTQpZi1s?si=KElOmSs6FCcEyk0S

A Sample Paragraph for Writing a Mixed Method Design in a Report



Mixed Methods Sequential Explanatory Design

The mixed methods sequential explanatory design consists of two distinct phases: quantitative followed by qualitative (Creswell, Plano Clark, et al., 2003). In this design, a researcher first collects and analyzes the quantitative (numeric) data. The qualitative (text) data are collected and analyzed second in the sequence and help explain, or elaborate on, the quantitative results obtained in the first phase. The second, qualitative phase builds on the first, quantitative, phase, and the two phases are connected in the intermediate stage in the study. The rationale for this approach is that the quantitative data and their subsequent analysis provide a general understanding of the research problem. The qualitative data and their analysis refine and explain those statistical results by exploring participants' views in more depth (Creswell, 2003; Rossman & Wilson, 1985; Tashakkori & Teddlie, 1998).

Names the design

Discusses interaction, timing, and priority

Discusses mixing

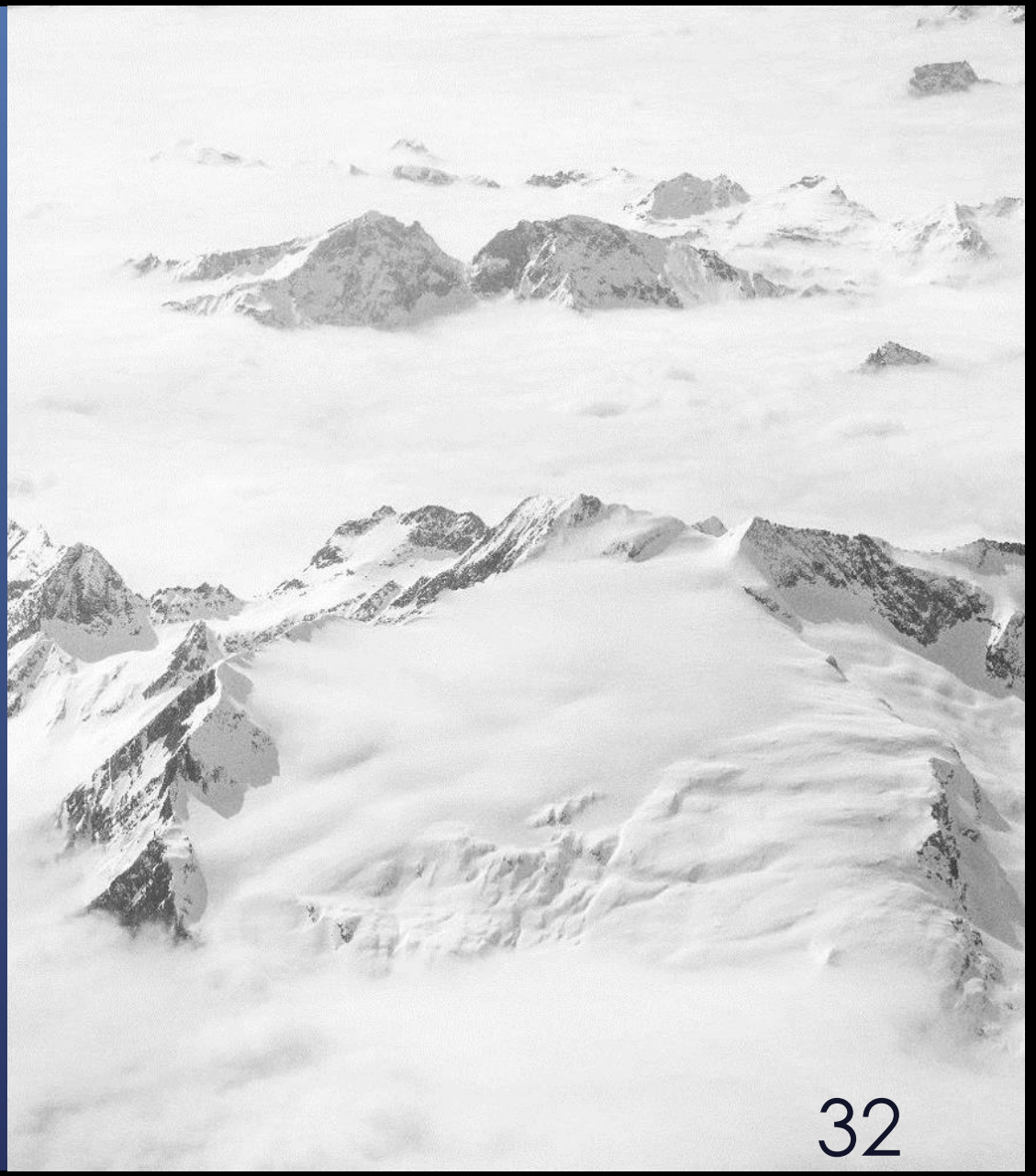
Discusses reason for the design

Cites methodological references

SOURCE: Ivankova, Creswell, and Stick, 2006, p. 5.

Advantages vs. Disadvantages of Mixed Method Research

- Advantages
  - Best of both world analysis
  - Method flexibility
- Disadvantages
  - Workload
  - Differing and conflicting results



"Social science methods should not be treated as mutually exclusive alternatives among which we must choose….our individual methods may be flawed, but fortunately the flaws are not identical. A diversity of imperfections allow us to combine methods….to compensate for their particular faults and imperfections".

Brewer and Hunter (1989) (pp. 16-17)

"Each strategy has its strength and weaknesses, and the drive for mixed method research….is to use one strategy to either inform, validate or compensate for the weaknesses of one another".

McKerchar (2008, p. 20)

THANK YOU

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