THE ADOPTION OF MIXED METHODS IN CHINA: AN EXPLORATORY INSTRUMENT DESIGN

Yuchun Zhou
University of Nebraska-Lincoln, yzhou@huskers.unl.edu

Follow this and additional works at: http://digitalcommons.unl.edu/cehsdiss

Part of the Educational Assessment, Evaluation, and Research Commons, and the Educational Methods Commons

http://digitalcommons.unl.edu/cehsdiss/209

This Article is brought to you for free and open access by the Education and Human Sciences, College of (CEHS) at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Public Access Theses and Dissertations from the College of Education and Human Sciences by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
THE ADOPTION OF MIXED METHODS IN CHINA:
AN EXPLORATORY INSTRUMENT DESIGN

by

Yuchun Zhou

A DISSERTATION

Presented to the Faculty of
The Graduate College at the University of Nebraska
In Partial Fulfillment of Requirements
For the Degree of Doctor of Philosophy

Major: Psychological Studies in Education
(Qualitative, Quantitative, and Psychometric Methods)

Under the Supervision of Professor John W. Creswell

Lincoln, Nebraska
August, 2014
THE ADOPTION OF MIXED METHODS IN CHINA:
AN EXPLORATORY INSTRUMENT DESIGN

Yuchun Zhou, Ph.D.
University of Nebraska, 2014

Adviser: John W. Creswell

Mixed methods is “the third research paradigm” and a methodology along with traditional quantitative and qualitative methodologies (Johnson & Onwuegbuzie, p.14). It is at the expansion/diffusion stage of development where researchers are most interested in how this method is adopted across disciplines and countries. However, very little literature is found regarding the use of mixed methods in non-Western cultural contexts, such as East Asia. Hence, the current study aimed to explore the expansion of mixed methods in an underrepresented population, China, a non-Western context and developing country.

The study employed an exploratory instrument design to investigate Chinese scholars’ decisions of adopting mixed methods as well as to examine the factors that predict such decisions. This study consisted of three phases: (1) the initial qualitative case study explored Chinese scholars’ perceptions and their use of mixed methods; (2) based on the qualitative results, an instrument was developed to measure the adoption of mixed methods; and (3) the follow-up quantitative survey used the instrument and examined Chinese scholars’ adoption of mixed methods.
The findings of the study revealed that China is adopting mixed methods but at a slow rate due to researchers’ insufficient expertise and a variety of practical issues, such as budget issues and publication difficulties. The influential factors on Chinese scholars’ intentions to use mixed methods were the perceived compatibility, reasons, and advantage of using mixed methods.

The current study examined the expansion of mixed methods in China and the practicability of this method in East Asian cultures. The study also constructed measures and a model of the adoption of mixed methods that can be used in the future research. The results of the study are of value to methodologists who want to understand how mixed methods has been accepted and applied in a non-Western country, and thus to improve the application and adaptation of this method to different cultures.
Acknowledgements

Completion of the dissertation and program of study would not have been possible without the support, encouragement, and help of my loving parents, dear advisor and committee members, colleagues, and friends.

First and foremost, I sincerely thank my advisor, Dr. John W. Creswell. He is the most wonderful advisor who I deeply respect. He has instructed and guided me in multiple methodologies of doing research. Under his supervision, I have grown up to become a methodologist who has strong interest in research. Besides academic guidance, Dr. Creswell has also given me a tremendous amount of support and help when I am stressed and depressed. He is like my family that I can trust in the United States.

I also want to express my sincere gratitude to my committee, Dr. Greg Welch, Dr. Kurt Geisinger, and Dr. Aleidine Moeller, who have not only instructed me but also guided me in completing my research. I would also like to thank the Department of Educational Psychology (Dr. Ralph De Ayala, Chair), the Nebraska Evaluation and Research Center (Dr. James A. Bovaird, Director), and the Office of Qualitative and Mixed Methods (Dr. Vicki Plano Clark, Director) for giving me the opportunity to gain research experience through working as research assistant and research consultant during my program study. My great gratitude also goes to my dear friend, Lan Li, who has supported me all the time and guided me through my academic career.

I am also thankful to many Chinese scholars in China who have assisted in my conduct of research, the colleagues in my program who have helped and contributed to the study, especially Chaorong Wu, Wei Wang, Amanda Garrett, Tim Guetterman, Nancy Anderson, Debra Miller, and Theresa McKinney.
Finally and most importantly, my deepest appreciation and love go to my parents, Youqi and Guiying, as well as my grandmother, Yuzhen Liang. Their unconditional love and support have been my inspiration throughout life. My parents are always supporting me and encouraging me, and cheering me up and standing by me through the good times and bad. Although my grandmother did not live to witness my completion of the doctoral degree, I believe she will be proud of me as she always was.
# Table of Contents

Chapter I. Introduction.............................................................................................................. 1

Research Problems.................................................................................................................. 2

Purpose Statement.................................................................................................................... 5

Research Questions.................................................................................................................. 6

Qualitative Questions.............................................................................................................. 6

Quantitative Questions and Hypotheses ................................................................................ 7

Mixed Methods Questions...................................................................................................... 8

Significance of the Study......................................................................................................... 9

Audience ................................................................................................................................ 9

Delimitations........................................................................................................................... 10

Summary.................................................................................................................................. 11

Chapter II. Theoretical Framework......................................................................................... 12

Philosophical Foundations ..................................................................................................... 12

Theoretical Assumptions ........................................................................................................ 14

Diffusion Theory of Innovations ........................................................................................... 14

Innovation-decision Process .................................................................................................. 15

Intrinsic Attributes of An Innovation.................................................................................... 16

Measures of Attributes .......................................................................................................... 18

Literature on the Existing Models and Measures of Innovation Diffusion ......................... 20

Literature on Mixed Methods ................................................................................................ 22

Definitions of Mixed Methods ............................................................................................... 22

Rationales for Using Mixed Methods .................................................................................... 23
Typologies of Mixed Methods Research Designs ..................................................25
Mixing Strategies .................................................................................................28
Evolution of Mixed Methods ................................................................................31
  Different Periods of Mixed Methods .................................................................32
  The Expansion Period of Mixed Methods ..........................................................33
Literature on Diffusion of Mixed Methods ...........................................................33
  Adoption of Mixed Methods Across Disciplines .................................................34
  Adoption of Mixed Methods Across Countries ..................................................37
Literature on Instrument Development Using Mixed Methods .........................44
  Instrument Development and Mixed Methods ....................................................47
  Instrument Validation Analysis and Mixed Methods ...........................................50
    Appropriate use of mixed methods .................................................................50
    Empirical studies of using mixed methods ......................................................52
  Instrument Development and Validation Analysis Process ..............................54
Summary of Chapter II .........................................................................................57
Chapter III. Method .............................................................................................59
  Research Design: Exploratory Instrument Design .............................................59
    Priority ..............................................................................................................61
    Timing ..............................................................................................................61
    Mixing Points .................................................................................................62
    Mixing Strategies ............................................................................................62
  Rationales for Using Exploratory Design ..........................................................63
  Participants and Sampling ..................................................................................64
Qualitative Phase .................................................................................................................. 64
Quantitative Phase .............................................................................................................. 66
Data Collection .................................................................................................................... 67
Qualitative Phase .............................................................................................................. 67
Quantitative Phase ............................................................................................................ 70
Measures ............................................................................................................................ 71
Variables ............................................................................................................................ 73
The Hypothesized Model ................................................................................................... 78
Data Analysis ...................................................................................................................... 79
Qualitative Phase .............................................................................................................. 79
Instrument Development and Validation Analysis Phase ................................................... 79
Panel Reviews ..................................................................................................................... 80
Sorting ................................................................................................................................. 81
Focus group discussion ..................................................................................................... 82
Pilot Study .......................................................................................................................... 83
Quantitative Phase ............................................................................................................ 84
Validation Strategies ......................................................................................................... 86
Qualitative Phase .............................................................................................................. 86
Instrument Modification Phase .......................................................................................... 87
Quantitative Phase ............................................................................................................ 87
Ethnical Considerations ..................................................................................................... 88
Summary of Chapter III ..................................................................................................... 88
Chapter IV. Results .................................................................89

Qualitative Results ........................................................................89

Case Description .............................................................................89

Themes About Issue of Use ..........................................................92

Instrument Development and Validation Analysis ......................104

Sorting Results for Instrument Development ..........................105

Confirmatory Factor Analysis for Scale Reliability and Validity ....112

Group Comparison for External Evidence of Validity .................122

Correlational Analysis for Concurrent Evidence of Validity .......124

Quantitative Results ........................................................................125

Descriptive Statistics of Variables .............................................126

Model Testing Results .................................................................128

Summary of Chapter IV ...............................................................132

Chapter V. Discussion ....................................................................134

Methodological Impact of the Study ............................................135

Mixing through Connecting Phases .........................................135

Research Questions and Hypotheses Refinement ....................136

Participant Selection .................................................................137

Scale Development ........................................................................138

Mixing through Merging Results ..............................................143

Generalization of the Initial Findings ........................................148

Instrument Developed in the Study ............................................151

Model Developed in the Study .....................................................154
Content Impact of the Study ................................................................. 155
Chinese Perceptions and Intentions of Using Mixed Methods .............. 156
  Perceptions of using mixed methods ............................................. 156
  Intentions of using mixed methods .............................................. 161
The Context on Adoption of Mixed Methods in China ......................... 163
The Influential Factors on Adoption of Mixed Methods ....................... 166
  Factors of intention of adoption .................................................. 166
  Factors of contact with mixed methods ....................................... 169
  Relationships between factors ..................................................... 172
Expansion of Mixed Methods in China .............................................. 175
Summary ....................................................................................... 178
Chapter VI. Conclusion ................................................................... 179
  Recommendations for Expansion of Mixed Methods ....................... 179
  Recommendations for Instrument Development and Validation Analysis .... 181
Limitations ..................................................................................... 185
Future Research ............................................................................. 186
Implications of the Study ................................................................ 188
References ...................................................................................... 190
Appendix A- Informed Consent Form for Telephone Interview ............. 212
Appendix B- Sample Interview Protocol ........................................... 214
Appendix C- Informed Consent Form for Survey .................................. 216
Appendix D- The Self-Assessment Questionnaire ............................... 218
Appendix E- Model of Adoption of Mixed Methods ........................... 231
Appendix F - The Flowchart of the Basic Procedures........................................ 232
Appendix G - The Diagram of the Exploratory Design........................................ 233
Appendix H - Recommendations for the Expansion of Mixed Methods ................... 234
Appendix I - Seven-Step Process of Scale Construction Using Exploratory Design..... 235
Appendix J - Instrument of Adoption of Mixed Methods ...................................... 237
Appendix K - Sample of Sorting Table for Judges............................................... 239
Appendix L - Sample of Translation Adaptation Table for Judges......................... 240
List of Tables

Table 2.1  Rationale for Conducting Mixed Methods Research ................................................. 25
Table 2.2  Summary of Expansion of Mixed Methods across Disciplines .......................... 38
Table 2.3  Summary of Expansion of Mixed Methods across Countries ......................... 40
Table 2.4  Summary of Instrument Construction & Mixed Methods ................................. 45
Table 3.1  Multiple Sources of Data in Case Study ................................................................. 65
Table 3.2  Sample Size and Information of Three Selected Chinese Universities .............. 67
Table 3.3  Measures & Scale Removal .................................................................................... 72
Table 4.1  Item Placement Hit Ratios of the First Round of Sorting .............................. 107
Table 4.2  Item Placement Hit Ratios of the Second Round of Sorting ......................... 107
Table 4.3  Inter-judge Agreements of the Sorting .................................................................. 108
Table 4.4  Cronbach’s α Internal Reliability Coefficients of the Final Scales .................... 113
Table 4.5  Standardized Factor Loadings ................................................................................. 117
Table 4.6  Inter-item Correlations ......................................................................................... 119
Table 4.7  Means and Standard Deviations for all Items ..................................................... 121
Table 4.8  Means, SDs, Ns and Bivariate Correlations of Variables ..................................... 126
Table 4.9  Examples of Mixed Methods Research in China ................................................ 97
Table 4.10 Table of Participants’ Demographic Information ............................................... 127
Table 4.11 Corrected Item-Total Correlations ..................................................................... 120
Table 5.1  Joint Display of Scale Development and Validation Analysis ....................... 139
Table 5.2  Joint Display: Confirming Qualitative Findings in Quantitative Survey ......... 146
Table 5.3  Table of Mixing Strategies ....................................................................................... 135
Table 5.4  Influential Factors of Chinese Adoption of Mixed Methods......................... 172
Table 5.5  Hypotheses of Chinese Adoption of Mixed Methods ................................... 174
Table 5.6  Integration in Exploratory Sequential Design ............................................. 150
List of Figures

Figure 1.1  Hypothesized Model of Adoption of Mixed Methods ........................................... 7
Figure 2.1  Model of Five Stages in the Innovation-Decision Process .................................. 16
Figure 2.2  Technology Acceptance Model .............................................................................. 19
Figure 2.3  Instrument Development and Construct Validation Framework ......................... 49
Figure 3.1  Prisma Flowchart of Data ..................................................................................... 69
Figure 4.1  The Measurement Model of Eight Factors .............................................................. 116
Figure 4.2  The Finalized Model with Standardized Coefficients ........................................... 130
CHAPTER I
INTRODUCTION

Mixed methods is “the third research paradigm” along with traditional quantitative and qualitative methodologies (Johnson & Onwuegbuzie, p.14). It is defined as the combination and integration of quantitative and qualitative methods in a single study or in a program of study (Creswell & Plano Clark, 2007; Creswell & Plano Clark, 2011; Greene, et al., 1989; Tashakkori & Teddlie, 1998).

The development and evolution of mixed methods has experienced six stages in the last 20 years: the formative stage (1980s and before), the paradigm stage (1980s to 1990s), the procedural stage (1980s to present), the advocacy stage (early 2000s to present), the reflective stage (2000s to present), and the expansion stage (2010s to present) (Creswell & Plano Clark, 2011; Tashakkori & Teddlie, 1998; Teddlie & Tashakkori, 2009). Research on mixed methods’ expansion is critical because it has revealed its applications in and adaptations to a range of disciplines (Glogowska, 2010; Karasz & Singelis, 2009; Kettles, Creswell, & Zhang, 2011; Tewksbury, 2009; Plano Clark & Wang, 2010; Shaw, Connelly, & Zecevic, 2010) and countries (Chow, Quine, & Li, 2010; Farquhar, Ewing, & Booth, 2011; Lopez-Fernandez & Molina-Azorin, 2011; Ngulube, 2010; Ring, Gross, & McColl, 2010).

Expansion, or diffusion, is a special type of communication, in which an innovation is spread among the members of a social system (Rogers, 2003). An innovation is an idea or a practice that is perceived as new by the population of adoption (Rogers, 2003), such as mixed methods being a new methodology to researchers. In the current study, mixed methods was assumed to be the innovation that fit in Rogers’ (2003)
definition of innovation. Such assumption was supported by Johnson and Onwuegbuzie (2004), “if one prefers to think categorically, mixed methods research sits in a new third chair, with qualitative research sitting on the left side and quantitative research sitting on the right side” (p.15).

As Rogers’ (2003) diffusion theory of innovations declared, the adoption process usually consists of five stages: the knowledge of an innovation, the conception of the innovation, the decision of adoption, the implementation of the innovation, and the confirmation of the adoption (Rogers, 2003). Among the five stages, the decision of adoption (i.e. whether to adopt the innovation or reject it) is most critical to the whole adoption process of an innovation. Rogers (2003) also pointed out that an individual’s decision of accepting or rejecting an innovation is usually influenced by five intrinsic characteristics of the innovation: the relative advantage, compatibility, simplicity, trialability, and observability. Yet, no research has explored the adoption process of mixed methods and the intrinsic characteristics of mixed methods using Rogers’ (2003) diffusion theory as a framework. Therefore, the current study employed Rogers’ (2003) diffusion theory to examine Chinese scholars’ decisions about adopting mixed methods and the influential factors on such decisions.

**Research Problems**

Although mixed methods has developed for 20 years, only the literature in the recent five years discussed the expansion of this method in different Western countries (Creswell, 2009; Teddlie & Tashakkori, 2009). Because mixed methods research began as an Anglo-American movement (Creswell & Plano Clark, 2011), little literature discussed how it has developed in non-Western cultural contexts such as East
Asia. Moreover, Teye (2012) claimed that the use of mixed methods in developing countries had not been adequately discussed in the literature. Hence, as an East Asian developing country, China represents an underrepresented population of the research on the use of mixed methods. Accordingly, the current study explored the use of mixed methods in China as a representative of a non-Western context and developing countries.

Research on the use of mixed methods in a different culture is necessary to the development of this methodology. Mixed methods’ expansion across cultures can reveal the application of this methodology in practice. If mixed methods is only applicable in Western cultures, the usefulness of this methodology will be very limited. Hence, research on the use of mixed methods in China is important because it can provide empirical examples of how widely this method can be used in a different culture.

Moreover, since the emergence of mixed methods in 1980s, it has experienced six stages of development, including the expansion stage that focuses on practical applications, especially about discipline adaptations and country adaptations (Creswell & Plano Clark, 2011; Tashakkori & Teddlie, 1998; Teddlie & Tashakkori, 2009). Thus, research on the use of mixed methods in an underrepresented country such as China can provide a comprehensive examination of the expansion of mixed methods.

Moreover, research on the use of mixed methods in specific disciplines in developing countries is necessary for methodologists to explore quality practices for using mixed methods in disciplines. Historically, mixed methods was widely adopted in behavioral and social sciences in developed countries (Morse & Niehaus, 2009; Tashakkori & Teddlie, 2003, 2010; Teddlie & Tashakkori, 2009; Teye, 2012). Accordingly, when mixed methods methodologists drafted the guidelines for using this
method in specific disciplines, they mostly considered the situations in developed countries. However, when one discipline adopts a new method, it requires a complete analysis and best practices for using this method in different situations, either in developed or developing countries, and either in Western cultures or non-Western cultures. Thus, research on the adoption of mixed methods in specific disciplines in China is necessary, for it can provide the needed information for a comprehensive understanding of mixed methods’ compatibility.

Furthermore, research on the use of mixed methods in China is necessary for Chinese scholars to improve their research skills. Recently, China has shown a fierce demand for learning and using mixed methods in various disciplines, including sociology, management, and education (Zhou & Creswell, 2012), however, only a few Chinese scholars currently use this method. It is believed that there are also many other developing countries like China that desire to use mixed methods but face certain challenges in using it. Therefore, research on the use of mixed methods in China is valuable because it can examine the unknown reasons that hinder the adoption of mixed methods in developing countries and provide useful suggestions for scholars to improve their research skills.

In addition to the above problems that drive the current study, another research problem that requires attention is the absence of scales to measure the adoption of mixed methods in literature. Likewise, the other goal of the current study was to develop an instrument and a model to measure the adoption of mixed methods.

Research on the measures of adoption is necessary because it can quantify individuals’ acceptance of using mixed methods, perceptions of using this method, and
intentions to use it in the future. Then, the quantitative data can be used to examine the relationship between variables, such as what kind of perceptions relate to individuals’ acceptance of using this method. Accordingly, methodologists can work on the influential factors in order to ultimately enhance the expansion of mixed methods.

Moreover, quantitative research on the use of mixed methods is also necessary to examine the process of adoption. As a new methodology, mixed methods experiences an innovation-decision process as described by Rogers’ (2003) diffusion theory: knowledge, persuasion, decision, implementation, and confirmation. Quantitative research cannot only indicate the current stage of adoption, but also identify what stage is most critical for a country or a discipline to adopt mixed methods. Accordingly, methodologists can work on the critical stages of adoption to enhance the adoption of mixed methods. Therefore, the current study aims to develop a testable instrument and a model of adoption that could be used in the future to investigate the adoption of mixed methods in different countries and disciplines.

Taken together, the study not only addressed the gap in the literature regarding the expansion of mixed methods in China, but also addressed the practical problems of the absence of an applicable instrument or model in the field of mixed methods.

**Purpose Statement**

The purpose of this exploratory instrument mixed methods study was to explore the adoption of mixed methods in China, including Chinese scholars’ decisions to adopt this methodology and to examine the factors that predict the decisions. The exploratory instrument design consisted of three phases. The initial qualitative case study explored Chinese scholars’ perceptions and use of mixed methods. Second, based on the
qualitative results, the existing *Technology Acceptance Model* (TAM) (Davis et al., 1989) and the relevant adoption scales (Moore & Benbast, 1991; 2001) were modified to measure the adoption of mixed methods. Third, the follow-up quantitative survey examined Chinese scholars’ intentions and experiences of using mixed methods using a large sample. In the discussion and interpretation, the qualitative and quantitative results were integrated and presented a full picture of the adoption of mixed methods in China, and demonstrated how the initial qualitative findings were generalized to a larger sample.

### Research Questions

The research questions of the mixed methods study included three qualitative research questions, five quantitative research questions, and three mixed methods research questions. All the questions addressed the unified purpose of studying Chinese scholars’ adoption of mixed methods. The population in the study was defined as Chinese scholars. The sample in the qualitative case study was purposefully chosen from East China due to the adequate information available in that area. The sample in the quantitative survey consisted of 247 scholars from the top 300 Chinese universities because they were identified as the adopters by the initial qualitative findings.

### Qualitative Research Questions

The initial qualitative case study was to explore Chinese scholars’ perceptions and use of mixed methods and any issues regarding its use. The research questions were:

1. How have Chinese scholars perceived mixed methods?
2. How have Chinese scholars used mixed methods?
3. How has the cultural context influenced Chinese scholars’ perceptions and use of mixed methods?
Quantitative Research Questions and Hypotheses

The goal of the follow-up survey was to examine Chinese scholars’ adoption of mixed methods and the influential factors. The following five research questions and five hypotheses were answered. The first two quantitative research questions were designed to be similar as the first two qualitative research questions of the study in order to confirm the initial qualitative findings..

1. How well have Chinese scholars perceived mixed methods?
2. How likely are Chinese scholars to adopt mixed methods?
3. What factors have impacted Chinese scholars’ decisions to adopt mixed methods?
4. Is the instrument reliable and valid to test the adoption of mixed methods?
5. What model best fits the decision by scholars to adopt mixed methods in China?

Moreover, according to the theoretically hypothesized model of *Adoption of Mixed Methods* (see Figure 1.1), five research hypotheses about the influential factors on adoption and the relationships between the factors and adoption were tested.

*Figure 1.1. Hypothesized Model of Adoption of Mixed Methods*
1. Chinese scholars’ intentions to use mixed methods would be positively predicted by their perceived compatibility, advantage, reasons, and ease of using mixed methods, as well as their contact with qualitative and quantitative methods.

2. Chinese scholars’ contact with mixed methods would be positively predicted by their perceived compatibility, advantage, reasons, and ease of using mixed methods, as well as their contact with qualitative and quantitative methods.

3. Chinese scholars’ perceived advantage of using mixed methods would be positively predicted by their perceived compatibility, reasons, and ease of using mixed methods.

4. Chinese scholars’ contact with mixed methods would be positively correlated with their intentions to use mixed methods.

5. Chinese scholars’ perceived compatibility, reasons, and ease of using mixed methods, as well as their contact with qualitative and quantitative methods would be correlated with each other.

**Mixed Methods Research Questions**

The following three research questions were answered by mixing the qualitative and quantitative phases of the study.

1. How have the initial qualitative findings regarding Chinese scholars’ perceptions and use of mixed methods been confirmed and generalized to a large sample through the follow-up quantitative survey phase?

2. Is the instrument developed better than any existing instruments, constructs or models to measure use of mixed methods?

3. How could mixed methods be enhanced and used more widely in China?
Significance of the Study

The study aims to advance the literature of the evolution of mixed methods by adding to our understanding of the expansion and adaptability of mixed methods in a different culture. It may help with the formation of an international community versed in mixed methods by presenting valuable information and suggestions on the adoption of mixed methods in specific disciplines and countries.

Moreover, the study aims to develop measures of the expansion of mixed methods. The newly developed instrument and model in the study can be used for future investigations of mixed methods’ diffusion across countries and disciplines.

Lastly, the study demonstrates the process of developing an instrument using the exploratory sequential mixed methods research design, and generates the recommended steps in developing and analyzing scales using this research design.

Audience

At least three types of audience will find the current study useful. They include (1) Chinese scholars who are interested in mixed methods, (2) research methodologists who work on the formation of an international community of mixed methods research, and (3) mixed methods researchers who are interested in instrument development.

The study would deepen Chinese scholars’ understanding of the advantages and the challenges of using mixed methods. It would make them think about the potential of adopting this method in their disciplines. The study would also offer Chinese scholars ways of improving their research expertise and conducting mixed methods research. Therefore, it is believed that Chinese scholars who are considering using mixed methods would be interested in reading the study.
Moreover, research methodologists, especially mixed methods specialists, would be interested in the study in order to understand how mixed methods has been accepted and applied in a non-Western country, and thus to improve the application and adaptation of this method to different cultures. At the very least, methodologists could generate targeted guidance for scholars in East Asian countries to help them design rigorous mixed methods research.

Lastly, researchers who are interested in using mixed methods to develop scales would be interested in this empirical mixed methods study. The study provides a systematic and rigorous way of instrument development and recommended steps of instrument development and validation analysis.

**Delimitations**

The delimitations of the study consisted of the limits in time, the limited number of participants, and the small number of research sites. Specifically, in the case study phase, not all mixed methods publications and relevant documents were reviewed due to the restricted resources for literature search. In addition, only a few mixed methods researchers were invited for the individual interview. Also, in the survey phase, only three Chinese universities were selected as the research sites.

Moreover, the study only examined the adoption of mixed methods in China in the recent five years, from 2007 to 2013. The investigator started the literature reviews and data collection in 2010 and finished the data analysis in 2013. Due to the limited time and funding of the study, the investigator could not examine the research topic in a wider range of China and in a longer time period. All of the above delimitations should be taken into consideration when generalizing the results of the study.
Summary

The chapter introduced the topic and research problems under study and the theoretical framework. The research purpose of the study was to examine the adoption of mixed methods in an East Asian developing country, China. Due to the absence of existing measures, the study was also aimed at developing an instrument and a model to measure the adoption of mixed methods. Rogers’ (2003) diffusion theory of innovation served as the theoretical framework in the study.

The exploratory instrument study was conducted in three phases: an initial case study, an instrument development phase, and a follow-up quantitative survey. In all, the current study contributes to the evolution of mixed methods as well as the measurement concerns of mixed methods’ expansion. Chinese scholars, methodologists, and mixed methods researchers will be interested in the results of the study. However, the audience should realize the delimitations of the study and thus be cautious to generalize the results of the study.
CHAPTER II
THEORETICAL FRAMEWORK

Introduction

This chapter introduces the theoretical framework of the study, including three components: (1) the philosophical foundations for mixed methods research, (2) the theoretical assumptions, and (3) the relevant literature of adoption of mixed methods. First, the philosophical foundations indicate the stance of multiple paradigms for the mixed methods study. Second, the theoretical assumptions include Rogers’ (2003) diffusion theory of innovations and Davis et al.’s (1989) technology acceptance model, as well as how these theories were assumed applicable to the investigation of mixed methods. Third, given that the study used an exploratory instrument design to measure the adoption of mixed methods, this chapter reviewed literature regarding four topics: (1) the literature on the existing diffusion models and measures, (2) the literature on mixed methods research, (3) the literature on the expansion of mixed methods, and (4) the literature on the instrument development using mixed methods approaches.

Philosophical Foundations

Several terms are used synonymously to indicate philosophical foundations, including philosophical assumptions, worldview, and paradigm. Philosophical foundations are a set of beliefs and assumptions about knowledge that inform a study (Guba & Lincoln, 2005). The philosophical foundations adopted in mixed methods research vary to specific designs. For instance, pragmatism is regarded the appropriate paradigm for a concurrent mixed methods study; whereas a combination of multiple paradigms is suitable for a sequential mixed methods research design (Tashakkori &
In recent years, more and more researchers have advocated the ideas of paradigm pluralism or multiple paradigms for mixed methods research (Greene & Caracelli, 1997; Greene, 2007; Tashakkori & Teddlie, 2010). Specifically, researchers are encouraged to adopt postpositivism in the quantitative phase and constructivism in the qualitative phase when they use a sequential mixed methods research design or an advanced design with a sequential element. Greene (2007) regarded the paradigm pluralism as a dialectic stance on mixing paradigms. According to Greene (2007),

“Important paradigm differences should be respectfully and intentionally used together to engaged meaningfully with difference and, through the tensions created by juxtaposing different paradigms, to achieve dialectical discovery of enhanced, reframed, or new understandings.” (p.69)

In addition to the paradigm pluralism, pragmatism has been reviewed as the best philosophical foundation for mixed methods research by 30 well-known mixed methods researchers (Tashakkori & Teddlie, 2010). Pragmatism employs what works, uses diverse approaches, and values both objective and subjective knowledge (Creswell & Plano Clark, 2011). Likewise, pragmatists believe in using as any and many methods as needed in a study to understand the research phenomenon (Tashakkori & Teddlie, 1998).

Lastly, in more recent years, other philosophies have emerged as a foundation for mixed methods research, such as the participatory-transformative paradigm for addressing inequality and injustice in society for underrepresented groups using culturally competent, mixed methods strategies (Mertens, 2003). This paradigm is most suitable to an advanced mixed methods design with a transformative framework guiding the inquiry.
In short, paradigm pluralism, pragmatism, or transformative paradigm can work as the appropriate philosophical foundations for mixed methods research in response to its specific research design and or theoretical stance. Given the fact that the current study used an exploratory sequential mixed methods design, I adopted paradigm pluralism as the philosophical foundations for the project. Specifically, I followed constructivism in the qualitative case study phase, where I highly valued participants’ perspectives and inductively explored the research phenomenon. In contrast, in the survey phase, I followed postpositivism, where I primarily used deductive thinking and focused on the relationships between variables.

**Theoretical Assumptions**

Given that the purpose of the study was to investigate the adoption process of mixed methods, I used Rogers’ (2003) diffusion theory as the theoretical assumptions to guide the design and conduction of the project. Johnson and Onwuegbuzie (2004) categorized mixed methods as “a new third chair” in the field of research methodology (p.15). Accordingly, the study assumed mixed methods as the innovative methodology that fits in Rogers’ (2003) definition of innovations.

**Diffusion Theory of Innovations**

Research on the diffusion of innovations started in the field of social sciences in Europe during the 1940s (Rogers, 2003). Up to the present, most of the diffusion literature has focused the discussion on the innovative technologies so that the term “technology” has been conventionally used as a synonym for innovation in the field of diffusion research (Rogers, 2003). However, when Rogers (2003) discussed his
innovation diffusion theory, he did not restrict the innovations to technology areas. He defined an innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (p.12), and specified “if an idea seems new to the individual, it is an innovation” (p.12). Therefore, it is reasonable to assume mixed methods as an innovation because it was a newly emergent methodology (Tashakkori & Teddlie, 1998) and a new way of thinking in research (Greene, 2007).

Among all the innovation diffusion research, the adoption-decision process and the rate of adoption in different social systems were the most popular topics (Rogers, 2003). Likewise, the current study focused on Chinese scholars’ decisions of adopting mixed methods as well as the factors that would predict the decisions.

**Innovation-decision Process**

Rogers (2003) reported the general diffusion model of the innovation-decision process, which consisted of five stages: knowledge, persuasion, decision, implementation, and confirmation (See Figure 2.1). Particularly, the decision stage is the most critical to the whole adoption process. It is a stage when an individual engages in activities that lead to a choice to adopt or reject an innovation.
Rogers (2003) also found that before an individual made the decision of adoption, approximately 49% - 87% of the variance in the rate of adoption was explained by the following five attributes of an innovation: the relative advantage, compatibility, complexity, trialability, and observability. For example, the perceived relative advantage of an innovation was highly and positively associated with the innovation’s rate of adoption (Rogers, 2003). That said, the more advantages an individual perceived the innovation would bring, the more likely the adoption in to be. Besides the relative advantage, the other four attributes of an innovation also had their unique effects on the adoption process as discussed in the following section.

**Intrinsic Attributes of Innovation**

As mentioned above, the five attributes of an innovation consist of the relative advantage, compatibility, complexity, observability, and trialability. First, the relative
advantage of an innovation is “the degree to which an innovation is perceived as being better than the idea it supersedes” (Rogers, 2003, p.229). Such advantage is often expressed as economic and social profitability, such as low initial cost, a decrease in discomfort, social prestige, a saving of time and effort, and immediacy of reward (Rogers, 2003). Diffusion scholars have found that this attribute is positively related to an innovation’s rate of adoption (Rogers, 2003). Likewise, in the current study, I investigated Chinese scholars’ perceptions of mixed methods’ relative advantage and the relation to their intentions of adoption.

Second, the compatibility of an innovation indicates the degree to which an innovation is perceived as a close fit to “existing values, past experiences, and needs of potential adopters” (Rogers, 2003, p240). Especially, the compatibility of an innovation, as perceived by members of a social system, is associated with sociocultural beliefs and norms (Rogers, 2003). Accordingly, the current study qualitatively explored Chinese scholars’ social values and beliefs and quantitatively examined its association with the adoption of mixed methods.

Third, complexity, also called ease of use, indicates “the degree to which an innovation is perceived as relatively difficult to understand and use” (Rogers, 2003, p.257). The complexity of an innovation, in contrast to the above two attributes, is negatively associated with an innovation’s rate of adoption (Rogers, 2003). Accordingly, the current study examined the barriers of Chinese scholars’ use of mixed methods and its relation to the adoption.

Fourth, the trialability of an innovation indicates the degree to which an innovation might be tried out to find out how it would work under one’s own conditions
(Rogers, 2003). The more easily an innovation can be tried out, the more rapidly the innovation will be adopted (Rogers, 2003).

Fifth, the observability of an innovation indicates the degree to which the results of an innovation are visible to others through observation and communication (Rogers, 2003). This attribute, as perceived by members of a social system, is positively related to an innovation’s rate of adoption (Rogers, 2003).

**Measures of Attributes**

A number of empirical studies have discussed the measures of the above five intrinsic attributes of an innovation, or more accurately, a technology innovation. The diffusion research of technology has been a well-developed arena. Researchers have constructed valid scales to investigate the five attributes of a technology innovation, such as the *Perceived Usefulness*, the *Compatibility*, the *Perceived Ease of Use*, the *Visibility*, and the *Trialability* (Davis et al., 1989; Moore & Benbasat, 1991; 2001).

Among the well-established scales, Moore and Benbasat’s (1991; 2001) measures of the five attributes have been highly recommended for the examination of any innovation. For example, to assess the relative advantage of a personal workstation, the item of Moore and Benbasat’s (1991; 2001) scale could be modified as: “using a personal workstation improves the quality of work I do” (Rogers, 2003). Therefore, in this study, I modified Moore and Benbasat’s (1991; 2001) scales to examine the attributes of mixed methods. I obtained the permission to use Moore and Benbasat’s (1991; 2001) scales from Benbasat in November 2012.

Besides the scales, there has also been a certain model that specifies the relations between the attributes of an innovation and its adoption. In the 1980s, Davis (1986) and
Davis, Bagozzi, and Warshaw(1989) published the *Technology Acceptance Model* (TAM), which has been widely used in numerous innovation diffusion studies (See Figure 2.2). I obtained the permission to use Davis et al.’s (1989) model from Davis in November 2012.

![Figure 2. Technology Acceptance Model (TAM).](image)

*Figure 2.2 Technology Acceptance Model (Davis, Bagozzi, & Warshaw, 1989)*

The model describes the prediction of the attributes of a new technology on its adoption. Specifically, the attribute of relative advantage as defined in Rogers (2003) is measured as perceived usefulness in the model; whereas the attribute of complexity is measured as perceived ease of use. Moreover, individuals’ adoption of a new technology includes attitude toward using, intention to use, and actual use of it. The model expresses the significant impacts of an innovation’s relative advantage and complexity on the adoption decision.

After Davis (1986), researchers have adapted and improved the original TAM by adding or dropping variables to examine the relations between the attributes of an innovation and its adoption (Davis, 1993; Liaw, 2002; Liaw & Huang, 2003; Oliveira & Martins, 2011; Venkatesh, Morris, Davis, & Davis, 2003). In the second phase of the current study, I modified the original TAM based on the initial qualitative findings and
relevant literature to investigate participants’ perceptions of mixed methods’ attributes and the relations to their adoption decisions (intention to use mixed methods and contact with mixed methods). The hypothesized model is demonstrated in Figure 1.1.

**Literature on Existing Models and Measures of Innovation Diffusion**

As mentioned above, based on Rogers’ (2003) diffusion theory, a number of researchers have focused on the improvement of models and scales to measure the adoption of innovations in different fields (Davis, 1993; Davis, Bagozzi, & Warshaw, 1989; Liaw, 2002; Liaw & Huang, 2003; Moore & Benbasat, 1991; 2001; Oliveira & Martins, 2011; Venkatesh, Morris, Davis, & Davis, 2003). This section reviews what models and scales have been developed in the research of innovation adoption.

Originally, Davis et al. (1989) discussed the theoretical model of technology acceptance (TAM) in information system. The model indicates how users’ attitudes and use of an information system are predicted by their perceived usefulness and ease of using the innovation. In addition to the technology acceptance model, researchers have also developed scales to measure users’ attitudes, intentions to use, perceived usefulness, and perceived ease of use (Davis, 1993; Venkatesh, et al., 2003).

Since then, the original information system technology acceptance model and scales have been continuously adapted, validated, and improved by researchers from different fields, such as web technology (Liaw, 2002; Liaw & Huang, 2003). Researchers have modified the model by adding or dropping new factors. For instance, Liaw (2002) developed an adaptive model of web use, which measures users’ web experience, web self-efficacy, web enjoyment, and perceived web usefulness, as well as their predictions to users’ behavioral intentions to use the web. Later, Liaw and Huang (2003) further
improved the model by incorporating the factors of quality of search system and motivation to Liaw’s (2002) model of web use.

In 1990s, based on Rogers’ (1983) diffusion theory and using personal work system as the innovation, Moore and Benbasat (1991; 2001) developed a parsimonious 38-item instrument as well as a short 25-item version of the instrument, which is comprised of eight scales: voluntariness, relative advantage, compatibility, image, ease of use, results demonstrability, visibility, and trialability. Moore and Benbasat’s (1991; 2001) instrument provided a useful tool for the study of the initial adoption and diffusion of innovations.

In the 2000s, Venkatesh et al. (2003) reviewed eight prominent models and their extensions in technology acceptance, and formulated a unified model, called the unified theory of acceptance and use of technology. They also validated the scales used in the unified model, including intentions to use, attitudes toward use, effort expectancy, performance expectancy, self-efficacy, and social influence.

In short, based on Rogers’ (2003) diffusion theory, the models and measures of innovation adoption have been developed and improved since the 1980s. Although the original TAM and scales were primarily about the adoption of information technology innovations, they have been widely used and adapted to other fields such as online technologies and web-based teaching and learning. Adoption researchers are generally interested in adopters’ perceptions, attitudes, and intention to use an innovation. Likewise, the current study aims to investigate the adoption of mixed methods, including how individuals perceive this methodology and use it in practice.

Therefore, the quantitative component of the study adapted the existing scales to
measure scholars’ attitudes and use of mixed methods, including the *Perceived Ease of Use*, the *Relative Advantage*, the *Compatibility*, the *Visibility*, and the *Result Demonstrability* (Moore & Benbasat, 1991; 2001), as well as the *Attitudes toward Using* and the *Intention to Use* (Venkatesh et al, 2003). After the quantitative data collection, the scale scores were then used in the adapted model from the original TAM (Davis, et al., 1989) to examine the relationship between participants’ perceptions and adoption of mixed methods. Before data collection, the permission to adapt the above existing measures and model was obtained from their original authors, Benbasat, Venkatesh, and Davis. The adaptations and modifications of the model and scales were made based on the initial qualitative findings and the relevant literature of mixed methods.

**Literature on Mixed Methods**

This section reviews the major topics of mixed methods research, including the definition, rationales, specific designs, mixing strategies, and the evolution process.

**Definitions of Mixed Methods**

Mixed methods (or mixed methods research, or mixed methods methodology) is a research methodology that mixes both qualitative and quantitative methods within a single study or in multiple phases of a study in the full process of research, including philosophical assumptions, research design, methods of data collection and analysis, and the interpretations of results (Creswell & Plano Clark, 2011; Greene, 2007; Johnson & Onwuegbuzie, 2004; Leech & Onwuegbuzie, 2009; Tashakkori & Teddlie, 2010; Teddlie & Tashakkori, 2009). The basic assumption of mixed methods is that mixing both qualitative and quantitative methods enhances the breadth and depth of understanding of the research phenomenon than either method by itself (Creswell & Plano Clark, 2011;
Johnson, Onwuegbuzie, & Turner, 2007). Mixed methods research has been called “the third methodology or research (along with qualitative and quantitative research).” (Johnson, Onwuegbuzie, & Turner, 2007, p.129)

Mixed methods research involves the logic of mixing, the collection and analysis of both qualitative and quantitative data, and the integration strategies of the two types of data at any point of the research process as needed. Specifically, the logic of mixing refers to the rationale(s) for mixing qualitative and quantitative approaches, specific research design, adopted paradigm(s), and mixed methods research questions. The explicit logic of mixing makes the qualitative and quantitative methods integrate thoroughly and rigorously.

**Rationales for Using Mixed Methods**

As early as the late 1980s, Greene, Caracelli, and Graham (1989) concluded five broad rationales for conducting mixed methods research: triangulation, complementarity, development, initiation, and expansion. Later, with the development of mixed methods, Bryman (2006) extended Greene et al. (1989)’s five rationales to sixteen common rationales, including triangulation or greater validity, offsetting weakness and providing stronger inferences, completeness, process, answering different research questions, explanation, unexpected results, instrument development, sampling, credibility, context, illustration, utility or improving the usefulness of findings, confirming and discovering, diversity of views, and enhancement or building upon quantitative or qualitative findings. Bryman’s (2006) rationales indicated that mixed methods could be used for a variety of reasons and in a wide-range of situations.

More recently, Fielding (2012) presented three broad reasons for mixing methods:
illustration, convergent validation, and the development of analytic density or richness. Illustration indicated that using one type of data to explain the other. Convergent validation occurred when the two different types of methods cross-validated each other for the same results. The development of analytic density or richness referred to the two types of data completing each other and thus providing a comprehensive picture of the research phenomenon. Similar to Fielding (2012)’s ideas, Guest (2012) summarized the rationales of mixing as follows:

“One data set provides information for subsequent data collection and analysis procedures; One data set explains or enhances the results from another data set (including the converted version of the same data set); Two or more data sets are compared and their relationship to each other observed (e.g., converge, diverge, contradict).” (p.148)


Although Fielding’s (2012) and Guest’s (2012) rationales were eminent, they were a little abstract to implement. In contrast, Collins, Onwuegbuzie, and Sutton (2006) specified four rationales of using mixed methods that closely related to the implementation process. The four rationales included participant enrichment, instrument fidelity, treatment integrity, and significance enhancement (see Table 2.1). Particularly, instrument fidelity referred to “steps taken by the researcher to maximize the appropriateness and/or utility of the instruments used in the study” and “the investigator
could assess the validity of information (i.e. qualitative or quantitative) yielded by the instrument(s) as a means of putting the findings in a more appropriate context.” (Collins, et al, 2006, p.76) The instrument fidelity rationale explicated the necessity and appropriateness of using mixed methods to develop and/or validate an instrument. The current study adopted this rationale to develop scales using mixed methods.

Table 2.1

<table>
<thead>
<tr>
<th>Categories</th>
<th>Formulated Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant Enrichment</td>
<td>Recruit participants; engaging in activities such as Institutional Review Board debriefings; ensure that each participant selected is appropriate for inclusion</td>
</tr>
<tr>
<td>Instrument Fidelity</td>
<td>Assess the appropriateness and/or utility of existing instrument(s); create new instrument(s) and assess appropriateness and/or utility</td>
</tr>
<tr>
<td>Treatment Integrity</td>
<td>Assess fidelity of intervention</td>
</tr>
<tr>
<td>Significance Enhancement</td>
<td>Facilitate thickness and richness of data; augment interpretation of findings</td>
</tr>
</tbody>
</table>

*Note.* From Collins, Onwuegbuzie, and Sutton (2006), p. 76

**Typologies of Mixed Methods Research Designs**

Besides the rationales for using mixed methods, a specific mixed methods research design is also necessary to a mixed methods study in expressing the logic and the way of mixing qualitative and quantitative methods in a single study or program. A number of researchers have discussed the typology of mixed methods research designs. Their discussions helped with the understanding of mixed methods research.

Teddlie and Tashakkori (2009) distinguished monomethod designs (in which only qualitative or only quantitative approaches are used across all stages of the study) from
mixed methods designs (which consists of at least one qualitative approach and one quantitative approach). That said, a study that uses two or more qualitative approaches is not a mixed methods study, but a monomethod study or multimethod research design.

In mixed methods designs, Teddlie and Tashakkori (2009) further categorized them into mixed methods monostrand designs and mixed methods multistrand designs according to whether the study had only one strand or more than one strand. A strand usually includes the conceptualization stage (e.g. planning a study), the experiential stage (e.g. conducting the study), and the inferential stage (e.g. interpreting the results). The mixed methods monostrand designs are also called “quasi-mixed designs” (Teddlie and Tashakkori, 2009, p.149), such as the monstrand conversion design, which allows for data transformation where one data form is converted into another and then analyzed accordingly. In contrast, mixed methods multistrand designs include at least two research strands.

Lastly, according to the time of mixing and the points of mixing stages, multistrand designs are further categorized as parallel mixed designs, sequential mixed designs, conversion mixed designs, multilevel mixed designs, and fully integrated mixed designs (Teddlie & Tashakkori, 2009).

Similarly to Teddlie and Tashakkori’s (2009) categories of multistrand designs, Leech and Onwuegbuzie (2009) presented a three-dimensional typology of mixed methods designs with the dimensions: “(a) level of mixing (partially mixed versus fully mixed); (b) time orientation (concurrent versus sequential), and (c) emphasis of approaches (equal status versus dominant status).” (p.268) They clarified that fully mixed methods designs involved mixing qualitative and quantitative methods within one
or more of the following components: “(a) the research objective; (b) type of data and operations; (c) type of analysis; and (d) type of inference” (p.267); whereas the partially mixed designs only involved mixing at the interpretation. Based on the three dimensions, Leech and Onwuegbuzie’s (2009) typology included the following eight mixed methods designs: partially mixed concurrent equal status design, partially mixed concurrent dominant status design, partially mixed sequential equal status design, partially mixed sequential dominant status design, fully mixed concurrent equal status design, fully mixed concurrent dominant status design, fully mixed sequential equal status design, and fully mixed sequential dominant status design.

More recently, Creswell and Plano Clark (2011) provided a concise but extremely applied typology, which focused on four elements of mixing: timing (pacing and implementation), priority, mixing (point of integration), and level of interaction. Their typology consists of six different designs, three basic ones and three advanced ones. The three basic designs are 1) the convergent parallel design in which two forms of data are concurrently integrated, 2) the explanatory sequential design in which qualitative data are built on quantitative data, and 3) the exploratory sequential design in which quantitative data are built on qualitative data. The three advanced designs include 4) the embedded design, in which one form of data are embedded within the other, 5) the transformative design, in which the whole research process is framed in a transformative lens, and 6) the multi-stage design, in which both of the two forms of data are combined in multiple phases of a program of study. The advanced designs encompass at least one of the basic designs, along with either another level of research design (e.g. case study, ethnography, or experimental design) or a framework (theoretical or program).
Lastly, Guest (2012) suggested simplifying the typology of mixed methods research designs through merely describing two dimensions (timing and purpose) of integration. However, Guest (2012) realized that only timing and purpose might not be adequate for the readers to fully understand the implementation process. Thus, Guest (2012) also suggested the researchers include a description and diagram of the points of interface.

Taken together, among all the dimensions of mixed methods research in the above typologies, mixing (or integration) is most critical. Data integration is at the heart of mixed methods research (Fielding, 2012). As Woolley (2009) defined integration in mixed methods research:

“Quantitative and qualitative components could be considered “integrated” to the extent that these components are explicitly related to each other within a single study and in such a way as to be mutually illuminating, thereby producing findings that are greater than the sum of parts.” (p.7)

**Mixing Strategies**

Mixing, also called integration or merging, is the most critical criteria used to evaluate a mixed methods study. Thus, the appropriate application of mixing strategies is very important. In general, mixing occurs at the research design level and/or at the method level according to Creswell and Plano Clark’s (2007) description of mixed methods:

“Mixed methods research is a research design with philosophical assumptions as well as methods of inquiry. As a methodology, it involves philosophical
assumptions that guide the direction of the collection and analysis of data and the mixture of qualitative and quantitative approaches in many phases of the research process. As a method, it focuses on collecting, analyzing and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone.” (p. 5)

In other words, mixing occurs at a design level when the investigators plan a mixed methods study, such as the rationales for mixing (Bryman, 2006) and the specific type of designs (e.g. concurrent or sequential, partially or fully mixed methods). By contrast, mixing at the method level refers to merging or connecting different types of data.

More specifically, mixing at the research design level might take place “concurrently by combining them (or merging them), or sequentially by having one build on the other, or embedding one within the other, or using a framework to bind together the data sets according to the specific research questions.” (Creswell & Plano Clark, 2011, p.5) In the convergent designs, qualitative and quantitative data are usually compared and corroborated for a comprehensive understanding. The mixing phase occurs concurrently and usually during data analysis or in interpretation. In contrast, in the sequential designs, one type of approach initiates or followed up the other approach to further investigate a research phenomenon. The mixing occurs sequentially and usually during data collection and also in interpretation. In short, the mixing strategies are associated with the specific research design and purpose. As Woolley (2009) suggested,
achieving maximum integration, one should link qualitative and quantitative components at all stages of the project, “beginning with its design, continuing through its execution, and culminating in its presentation” (p.22). Likewise, Boeije, Slagt, and Wesel (2013) also claimed that different research objectives required different ways and degrees of integration.

Compared with mixing at a design level, the mixing phase at the method level includes the strategies for merging data and the strategies for connecting data (Creswell & Plano Clark, 2011). The three most common strategies for merging data are (1) a side-by-side comparison for merged data analysis in discussion or in a summary table, (2) a joint display or a matrix, in which the researcher arrays both qualitative and quantitative data in a figure or table, and (3) data transformation merged analysis, in which the researcher transforms one type of data into the other type and compares both databases (Creswell & Plano Clark, 2011). For instance, data transformation techniques include quantitizing qualitative data for statistical analysis or qualitizing quantitative data for qualitative coding. In contrast, the popular strategies for connecting data refer to data analysis of the second data set based on the results of the first phase, participant selection at the second phase based on the results of the first phase, the generation of research questions at the second phase based on the results of the first phase, the instrument development at the second phase based on the results of the first phase, and the further explanation or exploration of the results of the first phase through the conduction of the second phase (Creswell & Plano Clark, 2011).

The implementation of mixing is complicated and iterative. Take an empirical study as an example. Jang, McDougall, Pollon, Herbert, and Russell (2008) conducted a
mixed methods study on school success. They used four mixing strategies: parallel integration for member checking, data transformation for comparison, data consolidation for emergent themes, and case analysis for fine-grained descriptions of school profiles. Jang et al. (2008) claimed, “the nature of the integration was iterative, moving back and forth between the qualitative and quantitative strands of data.” (p. 241)

Taken together, mixing is tremendously important to mixed methods research but challenging in implementation. According to Bryman (2007), in many mixed methods studies, the qualitative and quantitative components are barely integrated or are not integrated at all. One reason for the limited integration is that the rationale and purpose for doing so are not made sufficiently explicit (Collins, Onwuegbuzie, & Sutton, 2006). For instance, researchers do not intend to integrate qualitative and quantitative findings when they initially design the research. Without mixing, the study is called multi-methods research rather than mixed methods research. Another identified challenge of mixing is researchers’ technical problems, such as methodological preferences and skill specialisms (Morgan, 1998). In all, it is suggested that researchers think about the rationales of mixing at the beginning when they design a mixed methods study, and to appropriately utilize the mixing strategies (Bryman, 2007).

**Evolution of Mixed Methods**

Mixed methods research emerged early in the 1980s in different disciplines and various countries, including sociology, psychology, nursing, evaluation, health sciences, and education in the United States, the United Kingdom, and Canada (Creswell & Plano Clark, 2011; Tashakkori & Teddlie, 2010).
Different periods of mixed methods. The mixed methods community has gone through a rapid growth spurt since the two volumes of the *Handbook* came out in 2003 and in 2010 (Tashakkori & Teddlie, 2010). One of the current developments is the expansion of mixed methods across disciplines and countries. As Creswell (2009) mentioned, “the field of mixed methods will continue to expand across disciplines and fields.” and “generic books about mixed methods will no longer be needed; instead, will have discipline-based books.” (p.106)

In history, the development trajectory of mixed methods has been outlined in the following six overlapping periods: the formative period (1980s), the procedural development period (1980s, 1990s, up to present), the paradigm debate period (1990s), the advocacy and methodology movement period (2003 up to present), the reflective period (2008 up to present), and the expansion period (2010 up to present) (Creswell, 2009; Creswell & Plano Clark, 2011; Greene, 2008; Tashakkori & Teddlie, 1998, 2003; Teddlie & Tashakkori, 2009). According to Tashakkori and Teddlie (2010),

“Scholars writing within the two volumes of the *Handbook*, and outside of it, have repeatedly pointed to the fact that mixed methods is not new; its practices have deep-seated roots in social science research and evaluation. On the other hand, it is not old either; it has acquired a formal methodology that did not exist before and is subscribed to by an emerging community of practitioners and methodologists across the disciplines.” (p.803-804)

That said, the expansion of mixed methods is a new trend of the development of mixed methods. The relevant research on this new trend will benefit both practitioners in different disciplines and countries but also mixed methods methodologists.
The expansion period of mixed methods. In the past five years, mixed methods has entered the period of expansion and adoption. In the second volume of the *Handbook of Mixed Methods Research*, Tashakkori and Teddlie (2010) advanced a conceptual structure of mixed methods, which consisted of three overlapping perspectives: conceptual orientations, issues regarding methods and methodology, and contemporary applications of mixed methods. Specially, the contemporary applications of mixed methods included two domains: Creswell’s (2009) discussion on the adoption of mixed methods and Greene’s (2008) guidelines for practice.

Adequate research on the above two domains is needed because the two domains imply mixed methods’ applicability and practicability across disciplines and countries. Up to the present time, the research topics in the two domains have primarily included the application of mixed methods across fields of applied inquiry practice, pedagogical issues, and logistical issues. These topics are believed to be specialized into more sub-topics over the next years and thus to form a comprehensive list of topics associated with the application of mixed methods (Tashakkori & Teddlie, 2010).

The current study addressed the topic of application of mixed methods under the domain of Creswell’s (2009) adoption of mixed methods. More specifically, the study discussed the adoption of mixed methods in the international scene through investigating a non-Western country, China.

**Literature on Diffusion of Mixed Methods**

The expansion of mixed methods to different disciplines and countries represents the practical applications of this methodology. Previous literature about mixed methods’ expansion has suggested the following two trends. The summary of the diffusion of
mixed methods across disciplines and countries is reported in Table 2.2 and Table 2.3.

**Adoption of Mixed Methods Across Disciplines**

The first trend of the expansion of mixed methods indicates that mixed methods has been widely adopted across the following broad areas as well as their subfields: health sciences, evaluation, education, action research, management, sociology, human behaviors, and psychology (Creswell & Plano Clark, 2011; Morse & Niehaus, 2009; Small, 2011; Tashakkori & Teddlie, 2003, 2010; Teddlie & Tashakkori, 2009; Woolley, 2009). In more recent years, more specialized subfields within the above fields have adopted mixed methods, such as sociology (Woolley, 2009), early childhood (Boeije, et al., 2013), and culturally specific psychology (Bartholomew & Brown, 2012).

The literature of adoption of mixed methods across disciplines can be found in three types of publications: (1) methodological reviews, (2) commentary papers, and (3) empirical studies.

First, a number of researchers have summarized the use of mixed methods in their fields through methodologically reviewing the journal articles. For instance, in the United States, Truscott, Swars, Smith, Thornton-Reid, Zhao, Dooley, Williams, Hart, and Matthews (2010) examined eleven prominent English-language international and U.S. national educational research journals from 1995 to 2005. They found 332 out of the total 2381 studies used mixed methods and mainly in four educational subfields: literacy, mathematics, social studies, and methods. In Africa, Ngulube (2010) reviewed nine library and information science journals in Sub-Saharan Africa from 2004 to 2008. They found 48 out of 685 articles used mixed methods.

From 2006 to 2011, Onwuegbuzie and other researchers systematically reviewed
the published articles in a journal on counseling between 2002-2010 (Leech & Onwuegbuzie, 2011), a journal on special education between 2000-2005 (Collins, Onwuegbuzie, & Sutton, 2006), and four journals on school psychology (Powell, Mihalas, Onwuegbuzie, Suldo, & Daley, 2008). They found an increased number of published mixed methods studies in the above subfields in the past ten years.

In 2010, Alise and Teddlie (2010) concluded that the prevalence rate for mixed methods research varied due to the features of disciplines as well as the methodological orientation of journals. For instance, the prevalence rate for mixed methods research was 10% higher in applied disciplines (e.g. education and nursing) compared with that in pure disciplines (e.g. psychology and sociology). According to their report, the rate for mixed methods research in education was 24% as a whole.

While the above researchers are interested in the number of mixed methods studies in specific areas, other researchers focus on the quality of the use of mixed methods and thus providetargeted recommendations for adoption in different fields. For instance, Plano Clark, Huddleston-Casas, Churchill, Green, and Garret (2008) reviewed the application of mixed methods designs in family science, and suggested that family scientists consider using mixed methods. Molina-Azorin (2011) examined the leading journals in management fields (strategic management from 1997 to 2006 and entrepreneurship research from 2000 to 2007) and discussed the value added of using mixed methods in business management research.

Second, in addition to methodological reviews, researchers also advocate the use of mixed methods in different disciplines through commentary papers. For instance, Abowitz and Toole (2010) advocated the use of mixed methods research in construction
research. They argued that mixed methods was more ideal than a single method in social science research. Schifferdecker and Reed (2009) generated the basic guidelines for using mixed methods in the research of medical education. Likewise, Ring, Gross, and McColl (2010) commented on the advantages of integrating qualitative approaches and quantitative methods for life research. Rauscher and Greenfield (2009) advocated the use of mixed methods designs in contemporary physical therapy research. Lastly, other commentary papers discussed the use of mixed methods in the fields such as criminology and criminal justice (Tewksbury, 2009), multicultural counseling (Plano Clark & Wang, 2010), physiotherapy (Shaw, Connelly, & Zecevic, 2010), cross-cultural psychology (Karasz & Singelis, 2009), mental health nursing (Kettles, Creswell, & Zhang, 2011), speech and language therapy (Glogowska, 2010), health psychology (Dures, Rumsey, & Morris, 2010), medical education (Maudsley, 2011), special education research (Trainor, 2011), and bullying and school psychology (Hong & Espelage, 2012).

Third, besides reviews and commentaries, numerous empirical mixed methods studies have been conducted in various fields and subfields, such as the intervention in palliative care research in the U.S. (Farquhar, Ewing, & Booth, 2011), healthcare in the health sciences in Australia (Chow, Quine, & Li, 2010), and ego-identity development in psychology in Canada (Beran, Violato, Faremo, Violão, Watt, & Lake, 2012). In addition to the published articles, the mixed methods theses and dissertations have also dramatically increased in the past decade. Examining the Proquest search engine, Haines (2011) found that 3056 theses and dissertations between 2000 and 2009 were mixed methods studies, compared with 126 papers between 1990 and 1999, and 20 papers between 1980 and 1989. The list of the fields adopting mixed methods is still growing,
which indicates the application and adaptability of mixed methods across disciplines.

**Adoption of Mixed Methods Across Countries**

The application of mixed methods is not only observed in different disciplines but also found in more and more countries. More importantly, multiple fields within these countries have adopted mixed methods.

**Countries.** When mixed methods emerged in the late 1980s, scholars from the United States, the United Kingdom, and Canada initialized the use of mixed methods (Creswell & Plano Clark, 2011; Tashakkori & Teddlie, 2010). Following these scholars, many researchers from the world have gradually adopted mixed methods, including scholars from developed countries, such as Sweden (Ring, Gross, & McColl, 2010), Spain (Lopez-Fernandez & Molina-Azorin, 2011), Australia (Andrew & Halcomb, 2006), and Japan (Morita, Miyashita, Yamagishi, Akizuki, Kizawa, Shirahige, Akiyama, Hirai, Matoba, Yamada, Matsumoto, Yamaguchi, & Eguchi, 2012), as well as scholars from developing countries, such as South Africa (Ngulube, 2010), Ghana (Teye, 2012), China (Zhou & Creswell, 2012), and India (Edmeades, Nyblade, Malhotra, MacQuarrie, Parasuraman, & Walia, 2010). See the summary Table 2.3.
Table 2.2

**Summary of Expansion of Mixed Methods across Disciplines**

<table>
<thead>
<tr>
<th>Fields &amp; Sub-fields</th>
<th>Methodological reviews &amp; Commentary papers</th>
<th>Sample Empirical studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health sciences</td>
<td>(O’Cathain, Murphy, &amp; Nicholl, 2007)</td>
<td>Palliative care research (Farquhar, et al, 2011)</td>
</tr>
<tr>
<td>Medical education</td>
<td>(Schifferdecker &amp; Reed, 2009)</td>
<td>Healthcare (Chow, et al, 2010)</td>
</tr>
<tr>
<td>Physical therapy</td>
<td>(Shaw, et al, 2010)</td>
<td>Health services (O’Cathain, et al., 2007)</td>
</tr>
<tr>
<td>Speech and language therapy</td>
<td>(Glogowska, 2010)</td>
<td>Evaluation (Greene, 2007)</td>
</tr>
<tr>
<td>Medical education</td>
<td>(Maudsley, 2011)</td>
<td>Evaluation (Greene, 2007)</td>
</tr>
<tr>
<td>Evaluation</td>
<td>(Greene, 2007)</td>
<td>Business &amp; management(Molina-Azorin, 2011)</td>
</tr>
<tr>
<td>Education</td>
<td>(Creswell 2009);</td>
<td>Information (Ngulube, 2010)</td>
</tr>
<tr>
<td>Literacy, mathematics, social studies, and methods.</td>
<td>(Truscott, et al., 2010);</td>
<td>Information (Ngulube, 2010)</td>
</tr>
<tr>
<td>Special education</td>
<td>(Collins, et al., 2006; Trainor, 2011);</td>
<td></td>
</tr>
<tr>
<td>Bullying and school psychology.</td>
<td>(Hong &amp; Espelage, 2011).</td>
<td></td>
</tr>
<tr>
<td>Management:</td>
<td></td>
<td>Business &amp; management(Molina-Azorin, 2011)</td>
</tr>
<tr>
<td>Strategic; entrepreneurship</td>
<td>(Molina-Azorin, 2011)</td>
<td>Information (Ngulube, 2010)</td>
</tr>
</tbody>
</table>
• Psychology:
  • Counseling (Leech et al., 2011);
  • School psychology (Powell, et al, 2008);
  • Culturally specific psychology (Bartholomew et al. 2012)
  • Multicultural counseling (Plano Clark & Wang, 2010);
  • Cross-cultural psychology (Karasz & Singelis, 2009);
  • Health psychology (Dures, et al, 2010)

Ego-identity development (Beran, et al, 2012)

Childhood well-being (Jones & Sumner, 2009)
Table 2.3

Summary of Expansion of Mixed Methods across Countries

<table>
<thead>
<tr>
<th>Developed Countries</th>
<th>Developing Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States (Creswell &amp; Plano Clark, 2011; Tashakkori &amp; Teddlie, 2010)</td>
<td>South Africa (Geere, Hunter, &amp; Jagals, 2010; Ngulube, 2010)</td>
</tr>
<tr>
<td>United Kingdom (Colclough, 2010; Fielding, 2010; O’Cathain, Murphy, &amp; Nicholl, 2007)</td>
<td>Ghana (Teye, 2012)</td>
</tr>
<tr>
<td>Japan (Morita, et al., 2012)</td>
<td>Ethiopia (De Ver Dye, et al., 2011)</td>
</tr>
<tr>
<td>Canada (Beran, et al, 2012)</td>
<td>Tanzania (Chandler, et al., 2009)</td>
</tr>
<tr>
<td>Germany (Bernardi, Keim, &amp; von der Lippe, 2007)</td>
<td>Uganda (Boender, et al., 2012)</td>
</tr>
<tr>
<td>Netherlands (Kouwenhoven, et al., 2012)</td>
<td></td>
</tr>
</tbody>
</table>
Among the literature on the diffusion of mixed methods, there were more writings on the use of mixed methods in developed countries than those in developing countries, as Teye (2012) claimed:

“Most of the publications on this methodological strategy (mixed methods) have been written by scholars in the developed world. Consequently, the practical challenges associated with mixed methods research in developing countries have not been adequately discussed in the literature” (p.379).

Responding to the information gap, Teye (2012) examined the advantages and challenges associated with conducting mixed methods research in several poor African countries. Zhou and Creswell (2012) also addressed the adaptability of mixed methods in a developing Asian country, China, through investigating Chinese scholars’ perceptions of using mixed methods. Since 2007, at least three disciplines in China have used mixed methods in research, including sociology, education, and management. Many Chinese scholars have strong interest in using both qualitative and quantitative methods in a single study, however, they do not have adequate research expertise nor advanced skills in combining the two types of methods. Zhou and Creswell (2012) also mentioned some logistical issues that hindered the expansion of mixed methods in China, such as budget problems and publication difficulties. The current study continued the investigation on the use of mixed methods in a large sample in China to confirm the above qualitative findings and quantitatively identify the influential factors of the adoption of mixed methods. The results of the current study provided a general picture of how mixed methods is perceived and used in a developing Asian country.

**Fields within countries.** Mixed methods has not only been used in an increasing
number of countries, but has also been widely adopted in variety of fields and subfields within a country. For instance, in the United Kingdom, Colclough (2010) from the area of education described the use of mixed methods in the subfields of development studies and comparative education. Jones and Sumner (2009) from the area of psychology discussed the use of mixed methods in the subfield of childhood well-being. Likewise, O’Cathain, Murphy, and Nicholl (2007) from the area of health sciences concluded that mixed methods was common in health services research in the United Kingdom after examining the funded mixed methods research projects in England between 1994 and 2004. More recently, Fielding (2010) from sociology reported the increasing use of mixed methods in applied research, such as socio-legal research and research on social aspects of health and illness. In short, mixed methods has been used in various fields and subfields in the United Kingdom. In Australia, the use of mixed methods research has also been increasingly popular in disciplines such as health sciences and community health research (Andrew & Halcomb, 2006). Johnstone (2004) conducted a synthesis of literature on the adoption of mixed methods in Australia and claimed that the mixed methods approach was increasingly accepted in health service research.

Researchers in other developed countries have also reviewed the use of mixed methods in different fields. For instance, scholars in Spain reported the use of mixed methods in the field of behavioral sciences after examining 1,958 published papers in three reputable behavioral science journals between 2003-2008 (Lopez-Fernandez & Molina-azorin, 2011). Swedish researchers examined the publications in Quality of Life Research and argued that the field of quality of life research would benefit from an increased awareness of the value of combining qualitative and quantitative approaches
(Ring, et al, 2010). Other Swedish researchers from health sciences also advocated the use of mixed methods, especially in nursing and healthcare (Ostlund, Kidd, Wengstrom, & Rowa-Dewar, 2011).

As for the developing countries, a limited number of studies in literature discussed the use of mixed methods in their countries. For instance, Zhou and Creswell (2012) reported the use of mixed methods in China across three broad disciplines: education, health sciences, and sociology. In Sub-Saharan Africa, Ngulube (2010) reviewed 685 articles published in library and information science journals between 2004 and 2008 and found that the use of mixed methods research was growing yet still limited.

In addition to methodological reviews and advocacy papers, a growing number of empirical mixed methods studies have been conducted in recent years in different countries, including the United States, Canada, the United Kingdom, Germany, Netherlands, Australia, Pakistan, South Africa, Ethiopia, Tanzania, Uganda, China, Japan, and India (Andrew & Halcomb, 2006; Bernardi, Keim, & von der Lippe, 2007; Boender, et al., 2012; Camfield, et al., 2010; Chandler, et al., 2009; De Ver Dye, et al., 2011; Durham, et al, 2011; Fave, et al., 2009; Geere, Hunter, & Jagals, 2010; Harding, Simms, & Johnstone, 2004; Hinchcliff, et al., 2012; Kouwenhoven, et al., 2012; Ngulube, 2010; Morita, et al, 2012; O’ Cathain, Murphy, & Nicholl, 2007; Tareen, Davidson, & Rahman, 2009; Zhou & Creswell, 2012).

**International community of mixed methods.** The Mixed Methods International Research Association was founded in 2013. Since 2005, an international community has been forming around mixed methods through academic conferences, such as the annual *International Mixed Methods Conference* at the University of Leeds, the *Mixed Methods*
Day in the annual International Conference of Qualitative Inquiry, the special interest group on mixed methods research in the annual conference of American Educational Research Association.

However, the use of mixed methods in some East Asian countries, such as China, has not been fully explored. Research methodologists have little understanding of how mixed methods is accepted and used in these countries. Such a literature gap is critical to our understanding of mixed methods’ application in East Asian culture and the diffusion of mixed methods in a diversity of cultural contexts. Therefore, the current study aimed to work at the international level by using China as the research site to investigate the adoption of mixed methods in East Asia.

**Literature on Instrument Development Using Mixed Methods**

Using mixed methods to construct scales is not a new idea. A number of researchers have discussed the rationales of using mixed methods in instrument development, the specific mixed methods design in scale construction, the implementation steps, and validation strategies (Onwuegbuzie, Bustamante, & Nelson, 2010; Smolleck et al., 2006). Table 2.4 of the study summarized the relevant literature. The detailed information was reviewed in the following three sections: how to develop an instrument using mixed methods, how to do validation analysis using mixed methods, and what specific steps are related to the mixed methods research design.
Table 2.4

*Summary of Instrument Construction & Mixed Methods*

<table>
<thead>
<tr>
<th>Rationales for using mixed methods to construct scales</th>
<th>Mixed methods research design in scale construction</th>
<th>Implementing mixed methods to construct scales</th>
<th>Empirical studies and the fields</th>
<th>Validation strategies</th>
<th>Common steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Development (Bryman, 2006; Collins, Onwuegbuzie, &amp; Sutton, 2006; Greene et al., 1989); Instrument fidelity (Collins, Onwuegbuzie, and Sutton, 2006)</td>
<td>• Exploratory sequential mixed methods research design (Creswell and Plano Clark, 2011)</td>
<td>• A ten-phase process (Onwuegbuzie, Bustamante, &amp; Nelson, 2010)</td>
<td>• Health sciences (Hitchocock, et al, 2006)</td>
<td>• Qualitative approaches (Brod, et al., 2009)</td>
<td>• Panel reviews in defining the construct: i. Individual interviews (Dahodwala, et al, 2012)</td>
</tr>
</tbody>
</table>
- Childhood trauma (Boeije, et al, 2013),
- Language test (Lee & Greene, 2007)
- Expert judgments, logical analyses of literature, and empirical studies (APA/NCME, 1999)
- Multiple sources of evidence (Sireci, 2009)
- Meta-validation model (Onwuegbuzie, et al, 2009)
- Statistical analyses in validation:
  - i. Item analysis (Onwuegbuzie, et al, 2010)
  - ii. Exploratory factor analysis (Burton & Mazerolle, 2011)
  - iii. Confirmatory factor analysis (Burton & Mazerolle, 2011)
**Instrument Development and Mixed Methods**

Since mixed methods emerged in the 1980s, a number of researchers have discussed the rationale for using mixed methods to develop and validate an instrument (Bryman, 2006; Collins, Onwuegbuzie, & Sutton, 2006; Greene et al., 1989). Following the rationale, Creswell and Plano Clark (2011) presented a specific mixed methods research design for instrument development: exploratory instrument sequential mixed methods design, which consists of three phases: a qualitative phase in defining the construct of instrument, an instrument development phase including item generation and revision, and a confirming quantitative phase in analyzing the instrument.

So far, a number of researchers have adopted the exploratory design in instrument development (Crede & Borrego, 2013; Durham, Tan, & White, 2011; Hitchcock, et al, 2006; Nastasi, et al., 2007). For instance, Durham, Tan, and White (2011) used the exploratory design and developed a scale to assess the impact of clearance on livelihood assets in Lao through three stages: a qualitative stage including the literature review (etic perspective) and focus group discussions (emic perspective), an instrument development stage including item writing, and a scale testing stage. Durham et al.’s (2011) study described the process of developing a scale using the exploratory instrument design and discussed the challenges in the process.

Compared to Creswell and Plano Clark’s (2011) exploratory instrument design, Onwuegbuzie, Bustamante, and Nelson (2010) worked on the implementation of instrument development. Onwuegbuzie et al. (2010) published a mixed research framework (see Figure 2.3) for developing and assessing the fidelity of a quantitative instrument in *the Journal of Mixed Methods*, and presented a ten-phase instrument
development and construct validation analysis process for optimizing the development of quantitative scales. Since 2010, researchers have adopted the mixed methods framework and ten-phase process in instrument development (i.e., Ungar & Liebenberg, 2011). The ten phases were as follows. (Onwuegbuzie, Bustamante, & Nelson, 2010, p.60-61):

1. “Conceptualize the construct of interest”
2. “Identify and describe behaviors that underlie the construct”
3. “Develop initial instrument”
4. “Pilot-test initial instrument”
5. “Design and field-test revised instrument”
6. “Validate revised instrument: Quantitative analysis phase”
7. “Validate revised instrument: Qualitative analysis phase”
8. “Validate revised instrument: Mixed analysis phase: Qualitative-dominant crossover analyses”
10. “Evaluate the instrument development/construct evaluation process and product.”
The first four phases involve instrument development, where Onwuegbuzie et al. (2010) suggested researchers use both qualitative and quantitative approaches to gather the content and construct evidence of validity; whereas in the last three phases that involve instrument validation analysis, researchers suggested using crossover analyses to enhance the fidelity of the instrument. Onwuegbuzie et al.’s (2010) ten-step process was instructive in instrument development. Yet, the process is not associated with a specific
mixed methods research design. Hence, the current study demonstrated the process of using an exploratory instrument design to develop an instrument.

**Instrument Validation Analysis and Mixed Methods.**

Instrument validation analysis occurs as early as the time of instrument development, when researchers discuss how qualitative and quantitative approaches can be used to obtain the content and/or construct evidence of validity for an instrument. For instance, in the instrument development period, the content analysis of relevant literature, focus groups, and a panel review of judges usually assist in the formulation of the systematized concept and thus provide with the content evidence of validity for the instrument (Luyt, 2012). For another instance, when Abetz, et al. (2005) developed the cancer therapy satisfaction questionnaire, they discussed how they generated items based on the qualitative focus group discussion and then collect the content validity of the scale scores quantitatively.

**Appropriate use of mixed methods in validation analysis.** Mixed methods should be appropriate for instrument validation analysis when a construct is multifaceted and requires multiple sources of evidence. Mixed methods can use multiple types of data for the validation analysis, such as the theoretical support, subjective judgment, and statistical analysis (Hubley & Zumbo, 2011; Sireci, 2009).

According to Messick (1989), validity is defined as “the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of interpretations and actions based on test scores” (p. 6). In the modern view of validity, construct validity is viewed as the unitary concept, which subsumes content-related and criterion-related validity (Messick, 1998; Sartori & Pasini, 2007; Sireci & Sukin, 2013).
In contrast, validation refers to an ongoing process of “developing a scientifically sound validity argument to support the intended interpretation of test scores and their relevance to the proposed use.” (AERA/APA/NCME, 1999, p.9). In other words, validity is viewed as a property from an ontology perspective; whereas validation is the process of gathering evidence through philosophical, experimental, and statistical means to evaluate such property (Borsboom, Mellenbergh, & Heerden, 2004; Messick, 1989; Sireci & Sukin, 2013). Accordingly, qualitative and quantitative approaches can all be the appropriate strategies in the validation process.

A number of researchers have discussed the use of mixed methods in instrument validation analysis. Onwuegbuzie et al. (2010) argued that mixed methods could be used to provide evidences for all three types of content-related validity (face validity, item validity, and sampling validity) and some types of construct-related validity (i.e. substantive validity, outcome validity, and generalizability).

Taking the validation analysis for content validity as an example, Brod, Tesler, and Christensen (2009) argued that qualitative approaches (i.e. grounded theory) was the most appropriate way to support content validity; whereas Meurer, Rubio, Counte, and Burroughs (2002) preferred a standardized and statistical method for content evidence of validity, such as surveying a panel of experts and calculating the inter-rater agreement as well as the content validity index. Newman, et al. (2013) illustrated an interactive model that allowed the integration of the qualitative and quantitative methodst to collect content evidence of validity. They also presented a table of specifications, which was used to collect experts’ views of the accuracy and sufficiency of a specific concept and to calculate the agreement between judges.
AERA/APA/NCME (1999) claimed that the content evidence of validity could come from expert judgments, logical analysis of literature, and empirical studies. According to Newman, Lim, and Pineda (2013), when researchers attempted to estimate the agreement of the scale scores with the alignment of these concepts (qualitative) empirically (quantitative), the process was inherently mixed methods.

In addition to the multiple methods in the validation analysis of an instrument, Onwuegbuzie and Johnson (2006) also paid attention to the legitimation in the validation analysis when using mixed methods. The legitimation included the sampling integration, inside-outside, weakness minimization, sequential, conversion, paradigmatic mixing, commensurability, multiple validities, and political legitimation. Followed by Onwuegbuzie and Johnson (2006), Dellinger and Leech (2007) and Leech, Dellinger, Brannagan, and Tanaka(2010) further discussed how to evaluate a mixed methods study in a validation framework. The framework consisted of the quality of mixed methods research design, legitimation considerations, interpretive rigor, inferential consistency, as well as the utilization and consequential elements. That said, mixed methods could be used to provide various evidence of validity for an instrument, but does not guarantee the quality of such validation analysis. Only when researchers used mixed methods in a rigorous way, could they properly test their instrument.

**Empirical studies of using mixed methods in validation analysis.** A number of methodological and empirical studies have discussed the proper use of mixed methods for instrument validation analysis in fields such as health sciences (Hitchocock, et al, 2006), psychology (Luyt, 2012; Ungar & Liebenberg, 2011), education (Burton & Mazerolle, 2011; Crede & Borrego, 2013; Nassar-McMillan, et al, 2010; Smolleck, et al, 2006),
childhood trauma (Boeije, et al, 2013), and language test (Lee & Greene, 2007).

Theoretically, Onwuegbuzie, Daniel, and Collins (2009) and Onwuegbuzie and Johnson (2006) demonstrated a meta-validation model and a schematic representation of instrument score validity, including logically based validity (e.g. content-related validity) and empirically based validity (e.g. criterion-related validity, and construct-related validity).

Empirically, Lee and Greene (2007) presented how mixing qualitative and quantitative approaches provided the evidence for the predictive validity of a test. Morell and Tan (2009) demonstrated how mixed methods could be implemented to gather validity evidence and thus help to form the validation argument (Morell & Tan, 2009). In Morell and Tan’s (2009) study, the scores obtained through tests and surveys were quantitatively analyzed as the evidence for the internal validity, whereas the qualitative data from think-aloud and interviews provided context and information to clarify and explain issues.

Moreover, some researchers have illustrated how they used a mixed methods approach to adapt to culturally specific measures through ethnographic and factor analysis techniques (Hitchcock, Sarkar, Nastasi, Burkholder, Varjas, & Jayasena, 2006; Nastasi, Hitchcock, Sarkar, Burkholder, Varjas, & Jayasena, 2007). For instance, Hitchcock et al. (2006) used an exploratory sequential mixed methods design to develop the measure of mental health in Sri Lanka, and the researchers suggested the integration of qualitative methods to any instrument adaptation for a cultural group. More recently, Ungar and Liebenberg (2011) conducted mixed methods research to develop a culturally and contextually relevant measure of youth resilience through crossover comparison
analyses of the qualitative questionnaire and the qualitative interviews, and the researchers specifically discussed the advantages of mixing qualitative and quantitative approaches to the development of cultural-relevant measures.

Lastly, the current study used the exploratory instrument mixed methods design to develop and adapt a measure (Adoption of Mixed Methods) in China. Multiple sources of data provided the evidence for the validity of the measure, including the qualitative judge reviews and statistical analysis. The measure was designed to be culturally specific to East Asia.

**Instrument Development and Validation Analysis Process**

A number of empirical studies in the past five years have reported their detailed procedures in developing and validating an instrument (Agarwa, 2011; Agarwal, Xu, & Poo, 2011; Burton, et al, 2011; Dahodwala, et al, 2012; Melka, et al, 2011; Miller, et al, 2012; Luyt, 2012; Nassar-McMillan, et al, 2010). Although the researchers did or did not explicate the use of mixed methods, they combined qualitative and quantitative approaches in their instrument development process.

The process of instrument development usually consists of defining the construct and content domain, generating items, pilot testing the scale, revising the scale, and finalizing the scale (Burton & Mazerolle, 2011). Qualitative approaches (i.e. interviews with experts, literature review) are widely used to define the construct and to providethe content and face evidence of validity at the early stages of instrument development. In contrast, quantitative approaches (i.e., factor analysis) are usually used to collectthe construct evidence of validity, such as the convergent validity and discriminant validity.

In the early phases of instrument development, researchers usually consult a panel

In addition to the panel review, the literature review and an advanced qualitative design, such as ethnography (Crede& Borrego, 2013; Hitchcock et al, 2006; Nastasi, et al, 2007), are widely used in developing an instrument (Worthington & Whittaker, 2006). Lastly, as Smolleck et al. (2006) suggested, the panel review should be conducted iteratively in several rounds to provide content evidence of validity. In Smolleck et al. (2006)’s 13-step process of instrument development, the first nine steps are about defining and enhancing the collection of content evidence of validity.

Among all the above qualitative approaches, I have highly valued Moore and Benbasat’s (1991; 2001) two-stage sorting for verifying the items. It consists of a stage of unstructured sorting and a second stage of structured sorting. Specifically, when the preliminary items are generated and ready for review, a panel of experts is invited to sort all items into an unrestricted number of categories as well as to name and define each category. The judges are usually interviewed after sorting and invited to give suggestions for any revision. The inter-rater reliability among judges is calculated to provide the
evidence of validity. The process is useful in identifying the unclear items and in comparing the target constructs with the panel’s categories (Moore & Benbasat, 1991; 2001).

The second stage of structured sorting is usually conducted after the revision. Another panel of experts is invited to categorize the items into the given categories and identify any poor items that do not fit in any given category. The two-stage sorting procedure may be conducted in a series of iterative processes until high agreement was achieved among judges (Moore & Benbasat, 1991; 2001). In all, the two-stage sorting procedure is a qualitatively dominant approach of panel review together with a few quantitative data analyses. Using both qualitative and quantitative techniques in the sorting procedure, researchers should gain the confidence in defining the construct and content domains for their instrument.

Compared with the qualitatively dominant process in the early stage of instrument development, the following phases are more quantitatively oriented in providing the construct validity of an instrument. Item analysis and factor analysis techniques are widely used in the instrument validation analysis process (Onwuegbuzie, et al, 2010). Many researchers conduct exploratory factor analysis with principal components’ extraction to retrieve the factors, reduce the items, and examine the factor structure (Burton & Mazerolle, 2011; Dahodwala, et al, 2012; Martin & Sass, 2010; Melka, et al, 2011; Miller, et al, 2012). Confirmatory factor analysis is commonly used to cross-validate the factor structure following the exploratory factor (Burton & Mazerolle, 2011; Dahodwala, et al, 2012; Melka, et al, 2011; Miller, et al, 2012; Worthington & Whittaker, 2006; Weiss & Smith, 1999). Convergent and discriminant validities might be examined
through factor and correlations if there are existing scales similar to the construct of the newly developed scale.

In the current study, I combined qualitative and quantitative approaches to provide the content and construct evidence of validity for the newly developed instrument. Specifically, the initial case study findings, panel reviews, judge sorting results, and literature reviews were used to collect content evidence of validity, whereas confirmatory factor analysis was used to collect construct evidence of validity. Detailed steps in instrument development are recommended in the chapter of conclusion of the study.

**Summary**

This chapter reviewed the theoretical framework of the study, including the philosophical foundations for mixed methods research and the innovation diffusion theory. This chapter also reviewed the related literature of mixed methods research, such as the development of mixed methods research and the expansion of mixed methods across disciplines and countries, as well as the applications of mixed methods in instrument development.

Through discussing the theoretical framework for the study, I explicated that multiple paradigms were used to conduct the exploratory study, including the constructivism in the initial case study and the postpositivism in the follow-up survey. Because the topic of the study was about the adoption of mixed methods, Rogers’ (2003) diffusion theory of innovations and Davis et al.’s (1989)technology acceptance model were used as the theoretical foundations.

Moreover, due to the lack of existing measures in the adoption research of mixed methods, a number of technology diffusion scales were adapted to the study, including
Moore and Benbasat’s (1991; 2001) measures of adopters’ perceptions and Venkatesh et al.’s (2003) scales of adopters’ attitudes. Accordingly, Chinese scholars’ perceptions and attitudes of using mixed methods were measured using the adapted scales. Lastly, the current study employed the exploratory instrument mixed methods design to develop a culturally specific instrument of the adoption of mixed methods in China.
CHAPTER III

METHOD

Introduction

This chapter reports the exploratory instrument development research design that was used in the study, including the initial phase of qualitative case study, the middle phase of instrument development, and the follow-up phase of a quantitative survey. First of all, the chapter illustrates the specific research design and the rationale for using mixed methods. Then, the chapter reports the procedure of research implementation, including sampling, data collection, and data analysis for each of the above three phases. Particularly, this chapter summarizes the phase of instrument development and the discussion of content validity and construct validity, as well as the conduct of a pilot study with the new instrument. Lastly, the validation strategies and ethical considerations of the study are discussed at the end of the chapter.

Research Design: Exploratory Instrument Design

The current study used an exploratory instrument design (qual → QUAN = exploration): including an initial qualitative case study, a phase of instrument development, and a follow-up quantitative survey. The exploratory design is usually a two-phase or three-phase sequential design (if the researcher develops an instrument between the phases), in which the researcher starts by qualitatively exploring a topic before building to a quantitative phase in order to generalize the qualitative findings to a larger sample (Creswell & Plano Clark, 2011). The three-phase exploratory instrument design is a common variant of exploratory design, and is most useful when the researcher needs to develop and test an instrument (Creswell & Plano Clark, 2011).
Given that no scale existed in the field of mixed methods research to measure its expansion, the current study adopted the three-phase exploratory instrument design to develop an instrument to measure the adoption of mixed methods (see Figure 2.1). Specifically, I conducted the qualitative case study to explore the use of mixed methods in East China. Based on the qualitative findings, I modified the technology diffusion scales to measure the adoption of mixed methods. Next, the new instrument was tested with a sample of 247 Chinese scholars from three Chinese universities. The reliability and validity of all the scale scores were examined through a series of panel reviews, sorting procedures, and confirmatory factor analysis. Lastly, the verified scales scores were used in a hypothesized path analysis model to examine the relationships between participants’ perceptions of mixed methods and their intentions to use this methodology (see Figure 1.1). In all, the study investigates the use of mixed methods in China through three phases: a qualitative case study, an instrument development, and a quantitative survey (see the procedures in Appendix F).

A qualitative case study involves an exploration of a real-life, contemporary bounded case (bounded by time and place) (Yin, 2009). Typically, investigators collect and analyze multiple sources of information, and report both case description and case themes (Creswell, 2013). Likewise, the case in the current study was bounded by the geographical area of East China, which covers six of 23 provinces and one of four municipal cities in China. More detailed description of East China was reported in the chapter on results. East China was chosen as a representative case because (1) it is one of the six major executive areas in China and (2) it has adequate data available and accessible for investigation. Multiple sources of data (including individual interviews,
documents, published articles, theses and dissertations) were examined to explore the use of mixed methods in East China. Both the case description and themes were reported for the in-depth analysis of mixed methods’ expansion in China.

A survey is primarily a quantitative approach in which the investigator administers a questionnaire to a sample in order to describe their characteristics (i.e. attitudes, opinions, behaviors, and experiences) of the population (Gay, Mills, & Airasian, 2009). Likewise, the questionnaire in the current study was administered to a sample of Chinese scholars to understand their perceptions and experiences of using mixed methods. The initial case study and the follow-up survey were integrated rigorously in the whole process of the study, from the research planning phase to the results interpretation. The four elements of mixing are summarized as follows. More detailed information about the mixing in the study is provided in the chapter of discussion.

**Priority**

Priority of the current exploratory study was given to the quantitative survey phase because the primary purpose of the study was to examine the adoption of mixed methods in China in general. Moreover, an urgent need existed for developing an instrument to measure the adoption of mixed methods. The test of the newly developed instrument required a large amount of quantitative analysis. Therefore, priority was given to the quantitative phase of the study.

**Timing**

The study was conducted in a sequential order, from the qualitative case study and the instrument development phase to the quantitative survey phase. The three phases were connected, with the former ones building to the later phases. Specifically, the
instrument was developed on the basis of the qualitative findings; and the instrument phase built to the survey phase. In short, the study was sequentially implemented.

**Mixing Points**

Mixing points (points of integration) happened in the study when one phase built to the other in sequence. Specifically, the initial qualitative case study built to the follow-up quantitative survey through the following three aspects: (1) the quantitative research questions and hypotheses were refined based on the qualitative findings and the results of instrument validation analysis; (2) the sample of the survey was defined according to the qualitative results; and (3) the questionnaire in the survey was developed on the basis of qualitative findings and literature reviews. Moreover, the qualitative results and the quantitative results were also merged in discussion and interpretation using joint display and side-by-side comparison techniques to provide a complete picture of the adoption of mixed methods in China. More detailed information about the mixing is provided in the chapter of discussion.

**Mixing Strategies**

The study utilized the mixing strategies at two levels: the design level and the method level. At the design level, the study explicated the philosophical foundation of using multiple paradigms for the research, employed the specific mixed methods research design, discussed the rationales for mixing qualitative and quantitative methods, and adopting a rigorous mixed methods research design to connect the qualitative and quantitative phases.

At the method level, the mixing strategies that were used in the study included data connection (1) when I generated items and developed scales based on the results of
the initial case study phase; (2) when I selected the survey participants; (3) when I refined the quantitative research questions/hypotheses and the hypothesized model according to the results of the former instrument phase and qualitative phase, and (4) when the initial qualitative findings were further explored and generalized in the follow-up survey phase. Moreover, the qualitative and quantitative data were also merged in the discussion and interpretation of the study through side-by-side comparison and joint display approaches.

**Rationales for Using the Exploratory Design**

The rationales for using the exploratory instrument design for the study were three-fold. First, the exploratory design was particularly suited for the purpose of instrument development. Mixed methods was used for instrument development or “instrument fidelity” (Collins, et al, 2006, p.76) because no scales were available to measure the phenomenon under study, i.e. the adoption of mixed methods. In the exploratory instrument design, the qualitative results at the first phase helped to develop the instrument.

Second, qualitative approaches are usually preferred to explore the under-studied phenomenon, such as the adoption of mixed methods in China. Ever since the emergence of mixed methods early in the 1980s, very little literature has reported how mixed methods is acknowledged and perceived in the East Asian developing countries, including China. Thus, in the study, the qualitative case study phase was specifically useful to provide the in-depth description and analysis of Chinese scholars’ perceptions and use of mixed methods. Multiple sources of data, including individual interviews, documentations, published journal articles, and graduate students’ theses/dissertations were collected and analyzed. In short, qualitative approaches described the use of mixed
methods in China and also informed the development of the scales to measure the adoption of mixed methods.

Third, the follow-up quantitative survey was indispensible in the study. Although the initial qualitative phase represented the details of Chinese scholars’ use of mixed methods, it was difficult to generate such findings to a large sample of the population without the quantitative analysis. In the study, the survey phase not only confirmed the adoption of mixed methods in a large sample in China, it also helped with analyzing and testing the newly developed instrument.

Taken together, the exploratory instrument design was best suited for the research problems of the study. The initial qualitative findings assisted in building up the instrument for the follow-up survey. The integration of qualitative and quantitative methods provided a comprehensive picture of the adoption of mixed methods in China.

Participants and Sampling

Participants and Sampling in the Qualitative Phase.

In the qualitative case study phase, the case was bounded in East China due to the adequate information available in this area. All the data were purposefully selected from the case, including the individual interviews, commentary papers, journal articles, theses, and dissertations (see Table 3.1).

Particularly, the participants in the individual interviews were purposefully selected using a typical case sampling strategy. First of all, I reviewed the recently published mixed methods articles (either written in English or in Chinese) by Chinese scholars in China and identified the four most well-known Chinese scholars who are using mixed methods in East China. After identifying the scholars, I sent each of them an email of
invitation to participate in the study. Three of them accepted the invitation for the one-on-one telephone interviews and electronically signed the informed consent.

One of the interviewees was a director in an Academy of Educational Sciences in East China. She has participated in a number of mixed methods projects on early childhood education. The second interviewee was a professor from the Department of Sociology at a top university in East China. He obtained his Ph.D. degree in Hong Kong. He has used mixed methods in many social science research projects. He has also taught multiple methodology courses at his school. The third interviewee was a professor in management at a comprehensive Chinese university in East China. He has published a large number of commentary papers on the use of mixed methods, which have been highly cited by many Chinese scholars.

Table 3.1

*Multiple Sources of Data in Case Study*

<table>
<thead>
<tr>
<th>Sources of Data</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviews with well-know mixed methods scholars from East China</td>
<td>3</td>
</tr>
<tr>
<td><strong>Position</strong></td>
<td><strong>Discipline</strong></td>
</tr>
<tr>
<td>Interviewee 01</td>
<td>Director</td>
</tr>
<tr>
<td>Interviewee 02</td>
<td>Professor</td>
</tr>
<tr>
<td>Interviewee 03</td>
<td>Professor</td>
</tr>
<tr>
<td>Interviewees’ professional backgrounds</td>
<td>3</td>
</tr>
<tr>
<td>Commentary paper on the use of mixed methods in specific disciplines</td>
<td>18</td>
</tr>
<tr>
<td>Published mixed methods articles</td>
<td>6</td>
</tr>
<tr>
<td>Theses and dissertations that used mixed methods</td>
<td>36</td>
</tr>
<tr>
<td>Documents from media: news clips, public governmental reports, etc.</td>
<td>22</td>
</tr>
</tbody>
</table>
Participants and Sampling in the Quantitative Phase.

In the quantitative phase, 247 faculty members and senior graduate students from three Chinese universities participated in the survey. The population of the study was defined as Chinese scholars because they are the primary group who is using or will use mixed methods in China. The quantitative sample was 247 Chinese scholars in the top 300 comprehensive Chinese universities of 2012.

For sampling, I combined the random and criteria sampling strategies. At first, I randomly selected three Chinese universities among the top 300 comprehensive Chinese universities of 2012. The top 300 Chinese universities of 2012 were identified and published on the official website of college entrance exam (Rank of Chinese Universities, n.d.). The three selected universities were: (1) Henan Technology University, which was ranked at 225, with the outstanding disciplines in science and technology; (2) West China School of Medicine (Sichuan University), which was ranked at 12, renowned for medical research; and (3) Sichuan Normal University, which was ranked at 195, with distinguished educational programs.

After selecting the universities, I contacted the administrators of those universities to obtain the permission for my data collection. The administrators also assisted me in recruiting participants. I used the convenient and criteria sampling strategies at each of the three sites. The faculty members and senior graduate students were invited to participate in the survey if they had learned about research methodologies, qualitative and/or quantitative approaches. In the end, I recruited a total sample of 247 participants, averaging 80 at each site. The sample size for each university was reported in Table 3.2.
Table 3.2.

*Sample Size and Information of Three Selected Chinese Universities*

<table>
<thead>
<tr>
<th>Name &amp; Sample Size</th>
<th>Characteristics</th>
<th>Geographic Area</th>
<th>Rank of Chinese Universities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Henan Technology University n=91</td>
<td>Comprehensive; sciences and technology focused</td>
<td>Central China</td>
<td>225&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>West China School of Medicine n=82</td>
<td>Medicine focused; highly research focused</td>
<td>West China</td>
<td>12&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
<tr>
<td>Sichuan Normal University n=74</td>
<td>Comprehensive; teacher education focused</td>
<td>Southwest China</td>
<td>195&lt;sup&gt;th&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

**Data Collection**

**Data Collection in the Qualitative Case Study.**

The Institute Review Board (IRB) approval (see Appendix A) was obtained before the individual interviews. The interview protocol (see Appendix B) was designed to explore participants’ perceptions of using mixed methods. The telephone interview approach was chosen for the study due to the long distance between the investigator and the participants. A digital recorder and a telephone coupler were used for the telephone interview. All interviews were conducted in Chinese. Before data collection, translation of the interview protocol and informed consent was reviewed for accuracy by a group of Chinese graduate students at my university. The Chinese versions of the interview protocol and the informed consent were approved by the IRB. The average duration of interviews was approximately 60 minutes.

Besides the interviews, multiple types of data were collected, including journal
articles, dissertations, and public media documents (see Table 3.1). Published mixed methods articles and commentary papers on using mixed methods in China were retrieved from the database of EBSCO and a Chinese academic database, zhongguo qikan quanwen shujuku (CNKI). Graduate students’ theses and dissertations were retrieved from a well-known academic database of theses and dissertations in China, the Wanfang Dataset. The search terms included “mixed methods,” “qualitative and quantitative” for English-written papers, “hunhe yanjiufa” (mixed methods in Chinese), and “dingxing dingliang yanjiu” (qualitative and quantitative research in Chinese) for Chinese-written papers. At a result, 18 commentary papers, six published empirical mixed methods studies, 36 mixed methods theses and dissertations, and 22 documents were collected and analyzed in the case study. The process of the documents search and review was reported in the PRISMA flowchart as Figure 3.1.
Records identified via database searching:
31 journal articles; 218 commentary papers;
101 theses/dissertations; 37 documents

After removing duplicates and screening:
26 journal articles;
30 commentary papers;
97 theses/dissertations;
28 documents

Excluded records:
5 journal articles;
188 commentary papers;
4 theses/dissertations;
9 documents
Reasons: some of these do not have full text for analysis; some are duplicates

After assessing full-text for eligibility:
6 journal articles;
18 commentary papers;
36 theses/dissertations;
22 documents

Excluded records:
20 journal articles;
12 commentary papers;
61 theses/dissertations;
6 documents
Reasons: according to the framework of this study, these papers do not fit the criteria of mixed methods

Studies included:
6 journal articles (4 in English and 2 in Chinese);
18 commentary papers;
36 theses/dissertations;
22 documents

Figure 3.1 Prisma Flowchart of Data
**Data Collection in the Quantitative Survey**

After the qualitative phase, a separate IRB approval (see Appendix C) was obtained for the data collection in the survey phase. The quantitative research questions and instrument were built on the initial qualitative findings. The survey questionnaire was translated into Chinese and discussed by a panel of Chinese scholars (including five Chinese graduate students in the United States and five Chinese faculty in China) for the accuracy of translation. The Chinese versions of the questionnaire and the informed consent were approved by the IRB (see Appendix D).

The survey was conducted in several sessions at each site. The procedure of data collection is the same for every session as follows. First of all, the university administrators gathered the participants together. As the investigator as well as administrator of the survey, I briefly introduced mixed methods research and communicated with the participants about their understanding of this methodology. During the communication, I clarified the terms that were about to be used in the questionnaire and ensured participants’ understanding of these terms was consistent and accurate. When both the participants and I felt comfortable with their understanding of the survey, I gave them the paper-based questionnaire.

The overall response rate was 91%, 247 out of 270. The average time for completing the survey was approximately 10 minutes. Participants were asked questions about their demographic information (e.g. age, gender, discipline, etc.), perceptions of mixed methods, attitudes toward using mixed methods, experiences with this method, and intentions to use it in the future. Numeric data were collected in the survey.
Measures. Before the pilot study, the developed instrument originally consisted of eleven scales in total, including seven modified scales and six new scales (See Table 3.3). The seven modified scales were adapted from the technology diffusion scales to measure the adoption of mixed methods. Specifically, five of the seven scales were adapted from Moore and Benbasat (1991; 2001), including the Perceived Ease of Use (4 items; $\alpha=.84$), the Relative Advantage (5 items; $\alpha=.90$), the Compatibility (3 items; $\alpha=.86$), the Visibility (2 items; $\alpha=.83$), and the Result Demonstrability (4 items; $\alpha=.79$). The other two were adapted from the Attitudes toward Using (Venkatesh et al., 2003) (4 items) and the Intention to Use (Venkatesh et al, 2003) (3 items). In addition to the seven modified scales, six scales were newly generated in the study based on the analysis of the qualitative findings and literature. They were designed to measure participants’ knowledge and experiences of using mixed methods, including the Reasons to Use Mixed Methods (3 items), the Self-efficacy (6 items), the Barriers (4 items), the Contact with Qualitative Methods (6 items), the Contact with Quantitative Methods (6 items), and the Contact with Mixed Methods (6 items).

After the pilot study, two of the above eleven scales (the Visibility and the Result Demonstrability) were removed from the original instrument due to their poor psychometric properties. As a result, the instrument administered in the survey consisted of eleven scales with a total number of 50 items (See Table 3.3). Lastly, in addition to the items of content, there were four demographic questions in the questionnaire (see Appendix D).
Table 3.3

Measures & Scale Removal

<table>
<thead>
<tr>
<th>Scales in the Original Instrument (n=56)</th>
<th>Scales Used in the Survey (n=50)</th>
<th>The Retained Scales After Survey Data Analysis (see Appendix J) (n=36)</th>
<th>Rationales for the Scale Removal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Perceived ease of use (n=4)</td>
<td>1. Perceived ease of use (n=4)</td>
<td>1. Perceived ease of use (n=4)</td>
<td>Inappropriate for the real situation</td>
</tr>
<tr>
<td>2. Relative advantages (n=5)</td>
<td>2. Relative advantages (n=5)</td>
<td>2. Relative advantages (n=5)</td>
<td>Inappropriate for the real situation</td>
</tr>
<tr>
<td>3. Compatibility (n=3)</td>
<td>3. Compatibility (n=3)</td>
<td>3. Compatibility (n=3)</td>
<td>Poor reliability; little variance</td>
</tr>
<tr>
<td>4. Visibility (n=2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Result Demonstrability (n=4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Attitudes toward using (n=4)</td>
<td>4. Attitudes toward using (n=4)</td>
<td>4. Intention to use (n=3)</td>
<td></td>
</tr>
<tr>
<td>7. Intention to use (n=3)</td>
<td>5. Intention to use (n=3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Reasons to use (n=3)</td>
<td>6. Reasons to use (n=3)</td>
<td>5. Reasons to use (n=3)</td>
<td>Mis-specified; low reliability</td>
</tr>
<tr>
<td>9. Barriers (n=4)</td>
<td>7. Barriers (n=4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Self Efficacy (n=6)</td>
<td>8. Self Efficacy (n=6)</td>
<td></td>
<td>Mis-specified; low reliability</td>
</tr>
<tr>
<td>11. Contact with Qualitative Methods (n=6)</td>
<td>9. Contact with Qualitative Methods (n=6)</td>
<td>6. Contact with Qualitative Methods (n=6)</td>
<td></td>
</tr>
<tr>
<td>12. Contact with Quantitative Methods (n=6)</td>
<td>10. Contact with Quantitative Methods (n=6)</td>
<td>7. Contact with Quantitative Methods (n=6)</td>
<td></td>
</tr>
<tr>
<td>13. Contact with Mixed Methods(n=6)</td>
<td>11. Contact with Mixed Methods(n=6)</td>
<td>8. Contact with Mixed Methods(n=6)</td>
<td></td>
</tr>
</tbody>
</table>
Variables. As Table 3.3 showed, only eight scales in the study were found reliable and valid to measure what they are supposed to measure. Thus, the mean across items of each of the eight scales served as the outcome for the eight variables in the path analysis model of the study (see Appendix E). The more detailed information of the reliability and validity of the scores of the eight scales are reported in the chapter of results.

The three endogenous variables in the model were (1) Chinese scholars’ intentions to use mixed methods, which were assessed by the adapted scale of *Intention to Use*, (2) Chinese scholars’ use of mixed methods, which was measured by the newly developed scale of *Contact with Mixed Methods*, and (3) Chinese scholars’ perceived advantages of using mixed methods, which were measured by the adapted scale of *Relative Advantage*.

*Intention to Use (3 items).* Chinese scholars’ intentions to use mixed methods were assessed using the *Intention to Use* ($\alpha = .81$) on the scale from 1 (strongly disagree) to 7 (strongly agree), with higher scores indicating a stronger intention to use mixed methods in the future. The mean was as high as 5.18 on a 7-point scale.

*Contact with Mixed Methods (6 items).* Participants’ use, contact, and or skills with mixed methods were measured using the *Contact with Mixed Methods* ($\alpha = .79$). The sample items of the scale included “how many studies have you participated in using mixed methods?” and “how many articles that used mixed methods have you read?” Participants were requested to give a numeric response to these items. The responses were in an observed range from 0 to 58, with higher scores indicating a stronger expertise. Survey results indicated that the mean was low at 1.83, with a standard deviation of
4.68. That said, Chinese scholars’ use of mixed methods was poor and quite varied.

**Relative Advantage (5 items).** Participants’ perceived advantages of using mixed methods were assessed using the *Relative Advantage* ($\alpha=.85$) on the scale from 1 (strongly disagree) to 7 (strongly agree), with higher scores indicating a higher level of perceived advantages of using mixed methods. The mean was 4.88 on a 7-point scale.

The five exogenous variables in the model were (1) Chinese scholars’ perceived compatibility of using mixed methods, which was assessed by the *Compatibility*, (2) Chinese scholars’ perceived complexity/simplicity of using mixed methods, which was measured by the *Perceived Ease of Use*, (3) Chinese scholars’ perceptions of the reasons for using mixed methods, which were assessed by the *Reasons to Use Mixed Methods*, (4) Chinese scholars’ experiences with qualitative methods, which were measured by the *Contact with Qualitative Methods*, and (5) Chinese scholars’ experiences with quantitative methods, which were measured by the *Contact with Quantitative Methods*.

**Compatibility (3 items).** Participants reported how well mixed methods were compatible with their current work/research on a scale from 1 (strongly disagree) to 7 (strongly agree), with higher scores indicating a higher level of perceived compatibility. The mean of the scale ($\alpha=.80$) was 4.68 on a 7-point scale.

**Ease of Use (4 items).** Participants’ perceived ease of using mixed methods was measured on the scale from 1 (strongly disagree) to 7 (strongly agree), with higher scores indicating a higher level of perceived ease of using mixed methods. The mean of the scale ($\alpha=.73$) was 4.47 on a 7-point scale.

**Reasons to Use Mixed Methods (3 items).** Participants reported about their perceived needs of using mixed methods on the scale from 1 (strongly disagree) to 7
(strongly agree), with higher scores indicating a higher level of agreement with the necessity of using mixed methods. Sample items included “using mixed methods can solve complex research problems” and “using mixed methods can provide a complete understanding of research problems.” The mean of the scale ($\alpha= .88$) was 5.65 on a 7-point scale.

**Contact with Qualitative Methods (6 items).** Participants’ experiences, contact, and/or skills with qualitative approaches were measured by the Contact with Qualitative Methods ($\alpha= .78$). The sample items of the scale included: “How many studies have you participated in using qualitative approaches?” and “How many articles that used qualitative approaches have you read?” Participants were requested to give a numeric response. The responses were in an observed range from 0 to 58, with higher scores indicating a stronger qualitative research expertise. Survey results indicated that the mean was 3.24, with a standard deviation of 5.46.

**Contact with Quantitative Methods (6 items).** Participants’ experiences, contact, and/or skills with quantitative approaches were measured by the Contact with Qualitative Methods ($\alpha= .79$). The sample items of the scale included: “How many studies have you participated in using quantitative approaches?” and “How many articles that used quantitative approaches have you read?” Participants were requested to give a numeric response. The responses were in an observed range from 0 to 58, with higher scores indicating a stronger quantitative research expertise. Survey results indicated that the mean was 3.58, with a standard deviation of 5.41.

As mentioned above, after the pilot study, two scales, Results Demonstrability (4 items) and Visibility (2 items) were removed from the administered questionnaire. The
two variables were removed according to the results of data analysis in pilot study. More
details are reported later in the section of pilot study in this chapter.

Besides the above two scales, as Table 3.3 indicated, after the data analysis of the
survey data, three more scales were removed from the model analysis in the study. The
three deleted scales were the *Attitudes Toward Using*, *Barriers of Using Mixed Methods,*
and *Self-efficacy of Using Mixed Methods*. The detailed information about these three
scales is as follows.

**Attitudes Toward Using (4 items).** Chinese scholars reported their attitudes
toward using mixed methods on a 7-point scale, with higher scores indicating more
positive attitudes. The measure was adapted from the existing scale of *Attitudes Toward
Using* (Venkatesh et al, 2003). The mean of the scale was 4.72 out of 7, indicating
participants’ moderately positive attitudes toward using mixed methods.

However, the result was not trustworthy because the scale reliability (Cronbach’s
$\alpha = .29$) was extremely poor. By examining the item response patterns of the scale scores,
I found there was not much variability of item responses in the scale. Specifically, one
item had 75% of the participants choose “2” (disagree), “3” (somewhat disagree), and “4”
(neutral). This item was “It is a good idea to use mixed methods in my field.” The
majority of the participants did not agree with the statement.

In contrast, participants were more likely to agree with the other three items: “I
like using mixed methods,” “Using mixed methods is fun,” and “Mixed methods makes
work more interesting.” The three items had over 80% of the participants choose 4
(neutral), 5 (somewhat agree), and 6 (agree).

In other words, the item responses implied multidimensionality of the scale and
low variability so that the scale reliability was fairly low. Given that I did not have adequate time to revise the items for another run of the test, the entire scale was directly removed from the study.

**Barriers (4 items).** Participants reported about the barriers to using mixed methods on a 7-point scale, with higher scores indicating more barriers. The scale was developed based on the initial case study results and relevant literature reviews. The initial qualitative findings presented a variety of barriers when Chinese scholars conducted mixed methods research. However, the survey reported that the mean across items of the scale was 3.37 on a 7-point scale, indicating participants’ neutral perceptions of the barriers to using mixed methods.

However, the survey result was neither reliable nor valid because the reliability alpha of the scale ($\alpha=.48$) was poor. Moreover, the confirmatory factor analysis indicated a poor model fit for its unidimensional structure. That said, the scale was poorly specified. It might have more than one factor. Due to the limited time of the study, no extra effort was made to explore its structure and to retest it in another round. Therefore, the scale was directly removed from the model analysis of the study. Future study might continue working on improving this scale.

**Self-efficacy (6 items).** Participants reported about their mixed methods self-efficacy on a 7-point scale, with higher scores indicating a higher level of self-efficacy. The scale was developed based on the initial qualitative findings and literature reviews. The mean across items of this scale was 4.18 on a 7-point scale, indicating participants’ relatively high self-efficacy in mixed methods.

Unfortunately, the result was not reliable because the Cronbach’s alpha of the
modified scale ($\alpha = .64$) was low. Moreover, the hypothesized one-factor measurement model did not fit the data. The poor model fit implied multidimensionality and mis-specification for the construct. Due to the limited time of the study, no extra effort was made to explore its structure. Therefore, the scale was directly removed from the study.

**The hypothesized model.** The hypothesized model was a path analysis model as shown in Figure 1.1. Three attributes of mixed methods (relative advantage, compatibility, and ease of use/complexity) and three variables of knowledge of mixed methods (reasons, qualitative experience, and quantitative experience) were hypothesized to predict participants’ intentions to use mixed methods and participants’ contact with mixed methods.

The hypotheses were consistent with the literature. According to the diffusion theory (Rogers, 1983) and the technology acceptance model (Davis, 1986), participants’ intentions to use mixed methods are predicted by the three attributes of mixed methods: relative advantage, compatibility, and ease of use. Moreover, the initial qualitative findings and the literature of mixed methods research (Creswell and Plano Clark, 2011) indicated that individuals’ research experience influenced their intention to use mixed methods. Thus, the model hypothesized that Chinese scholars’ intention to use mixed methods and contact with mixed methods would be influenced by their perceptions of mixed methods’ relative advantage, compatibility, and ease of use, reasons to use, contact with qualitative methods, and contact with qualitative methods.

Moreover, consistent with Davis et al.’s (1989) Technology Acceptance Mode, the adapted model in this study also hypothesized that participants’ perceptions of mixed methods’ compatibility, ease of use, and reasons would predict their perceived advantage
Lastly, participants’ intention to use and contact with mixed methods are hypothesized to correlate with each other. Furthermore, perceived mixed methods’ relative advantage, compatibility, and ease of use, reasons to use, contact with qualitative methods, and contact with qualitative methods are hypothesized to be associated with each other. Taken together, the adoption model of mixed methods is hypothesized as the one shown in Figure 1.1 on the basis of the theories, literature, and the initial qualitative findings.

**Data Analysis**

**Data Analysis in the Qualitative Phase.**

In the initial qualitative case study phase, interview data were transcribed immediately after each individual interview. Transcripts were analyzed in Chinese in order to keep the original meanings of participants’ perspectives. Multiple types of data were triangulated to generate the most comprehensive and trustworthy themes. The inductive coding procedure for all sources of data was conducted according to the instructions of Miles and Huberman (1994) and Thomas (2003). Specifically, codes were first assigned to the information segments, followed by aggregating the codes into broader themes, and reexamining the database for useful quotes to provide evidences for the themes. More information regarding the validation was reported in the next section of Validation Strategies.

**Data Analysis in the Instrument Development and Validation Analysis Phase.**

On the basis of qualitative findings and literature reviews, the items and scales were generated to measure the adoption of mixed methods. The major process of scale
development included (1) the conversion of the qualitative themes from the initial case study to the quantitative scales and (2) the conversion of qualitative codes/quotes to survey items. More detailed information is discussed in the discussion chapter and Table 5.1. After the initial development procedure, the items of the instrument was reviewed and analyzed through panel reviews and sorting for the content evidence of validity, through focus group discussion for the translation adaptation from English to Chinese, and through a pilot study for the construct evidence of validity.

**Panel reviews.** Content validity of the thirteenscales in the original instrument (refer to Table 3.3) was discussed based on the literature reviews, the initial qualitative findings, and panel reviews (refer to Table 5.1). First, the thirteenscales were generated to measure the adoption of mixed methods on the basis of the literature reviews of diffusion theory and mixed methods research as well as the qualitative case study findings of Chinese scholars’ use of mixed methods.

In addition to the literature and qualitative findings, a panel review was conducted to provide content evidence of validity for all the scales. Panel reviews or expert judgments are commonly used for content evidence of validity because they provide the information about how well the items represent the content domains (AERA/APA/NCME, 1999). In the study, the panel consisted of five mixed methods scholars who had learned and conducted mixed methods research for years. The English versions of all the scales were sent to the panel for a discussion of content validity, including (1) how the scales reflected their targeted content domains and (2) how complete the items represented their domains. As a result, the five mixed methods experts consistently agreed that the items of each scale appeared to assess its targeted domain in a complete way. The panel also
provided suggestions on the revisions of items to make the items clear and concise. Revisions were made according to the panel’s comments.

**Sorting.** After the panel review, a two-stage sorting (Moore & Benbasat, 1991, 2001) was conducted. Sorting is usually used to examine to what degree judges agree with each other about grouping items into the same categories. The inter-rater agreement provides content evidence of validity (Agarwa, 2011; Agarwal, Xu, & Poo, 2011). In the study, the sorting was conducted in two rounds, and the sorting results were analyzed quantitatively, including the hits ratio, raw agreement, and Cohen’s Kappa. All these statistics are reported in the chapter of results. The procedure of the sorting is reported as follows.

In the first stage of sorting, a panel of three advanced doctoral students majoring in mixed methods methodology was invited to sort all items into eleven labeled categories as well as to rate how well each item demonstrated its category on a 10-point Likert scale, with higher scores indicating a higher level of representativeness. The judges were also invited to define the categories and or refine the labels of the categories (see Appendix K). Then, the inter-rater agreement among the three judges was examined through calculating the hits ratio for each category. The hits ratios were all higher than .67 (See Table 4.1), which implied good validity and reliability.

The highly rated items in each scale were kept for the second round of sorting. One thing worth mentioning is that all the highly rated items of the five adapted scales from Moore and Benbasat (1991; 2001) turned out to be the items from the suggested short version of the five scales. Moore and Benbasat (1991; 2001) provided two versions (a long version and a short version) of their scales. I adapted the long version for the first
round of sorting. The sorting results gave me the confidence to use the adapted short version. Thus, I used the short version in the second round of sorting.

In the second stage of sorting, another two advanced doctoral students majoring in mixed methods were invited to sort the retained items to the given eleven categories and to rate how well each item demonstrated its category on a 10-point Likert scale. The judges were also invited to give suggestions about the items after sorting them into categories (see Appendix K). Lastly, the inter-rater reliability was examined through calculating the hits ratio, raw agreement, and Cohen’s Kappa. As a result, the average hits ratio across the eleven categories was higher than .67, the raw agreement was higher than .96, and the Kappa was higher than .65 (See Table 4.3). All items were highly rated by the judges for reflecting its construct. One item was revised from using “work” to using “research” according to the judges’ suggestions. In short, the sorting provided evidence of good validity and reliability of the developed instrument.

**Focus group discussion.** After the sorting procedure, another step needed in the study was to adapt the English version of the scales to a Chinese version according to Geisinger’s (1994) suggestions on cross-cultural scale translation. In the study, a focus group of five Chinese doctoral students who had learned and conducted mixed methods studies was interviewed to review the translated items for the clarity, conciseness, accuracy, and face validity. The reviewers were provided with the items in both English and Chinese in a random order. They were asked to rate how well the Chinese version represented the English version for each item on a 10-point Likert scale, with higher scores indicating a higher level of representativeness. The reviewers were also asked to provide suggestions for the poorly rated items (see Appendix L) until all items were rated
higher than 8 on the 10-point scale. A few minor revisions were made according to
reviewers’ suggestions and discussions.

**Pilot study.** A pilot study of the scales (Chinese version) was conducted using a
sample of five Chinese graduate students in the U.S. and five Chinese faculty members in
China. After each participant completed the questionnaire, I interviewed them and
discussed with them about the clarity of instructions and items, timing, and their
understandings of the items.

From the discussions, I found the participants in China had a different
understanding of the empirical qualitative research from the Chinese participants in the
U.S. For example, the participants in China regarded the qualitative research as the
literature review studies. Realizing the misunderstanding, I decided to include certain
instructions for the questionnaire by adding the definitions of qualitative research,
quantitative research, and mixed methods research. Moreover, I decided to have a brief
discussion with my participants each time before I gave them the questionnaire in order to
eliminate any misunderstandings of the items.

The pilot study results indicated that two scales fit the data poorly and showed a
low reliability. They were the *Results Demonstrability* (4 items) and the *Visibility* (2
items). To understand the reasons why the two scales did not work well, I conducted a
follow-up discussion with my participants about the two scales.

The five participants in China told me that the contents of the items did not fit
their real situations in research. Take the following item in the scale of *Results
Demonstrability* as an example: “I would have no difficulty telling others about the
results of using mixed methods.” The participants either did not conduct or never
presented mixed methods research. The participants’ explanation was reasonable. The scale asks the questions about the presentation of mixed methods research results so that it assumes that participants had the experiences with mixed methods research. However, the sample of the survey includes the advanced graduate students who barely have research experiences. Therefore, the scale is not appropriate for those who have not yet used mixed methods. Thus, it was removed from the questionnaire.

The similar problem existed in the scale of Visibility. The scale consists of two items. One of them asks, “I see people using mixed methods.” Participants gave different interpretations of the word of “see” in the item. Some participants agreed with the item because they had read the published empirical mixed methods studies; while others did not regard such literature review as “seeing people using mixed methods.” In short, the visibility question is confusing and imprecise to those participants who had not much experiences in using mixed methods. Thus, the scale was removed from the questionnaire.

Taken together, the two scales were removed because they were problematic in measuring my participants' perceptions of using mixed methods. They had the poor psychometric properties and irrelevant contents to the real situations of the study.

**Data Analysis in the Quantitative Phase.**

There are two major tasks in data analysis at the quantitative phase: (1) the psychometric analysis of the scale scores and (2) the test of the hypothesized model. First, the reliability and validity of the scale scores (refer to Table 3.3) were examined through confirmatory factor analysis in Mplus 6. Confirmatory factor analysis is most commonly used to analyze the factor structure for newly developed instrument
(Worthington & Whittaker, 2006; Weiss & Smith, 1999), however, confirmatory factor analysis assumes the data are truly continuous and measured in an interval scale that assumes equal difference between options. Thought, the survey data in this study were mostly measured by Likert-style questions that imply an ordinal scale with unequal space between categories. In other words, the best data analysis should be the latent trait measurement model for ordered categorical data (i.e. the graded responses polytomous IRT model) but not the confirmatory factor analysis measurement model. However, the study simply treated the data as truly continuous data and used confirmatory factor analysis. This is the procedure that the majority of researchers usually do with Likert-scale data. Nevertheless, this is one of the limitations in data analysis in the study. The detailed data analysis procedure of the instrument data is reported in the chapter of results.

Second, the hypothesized model was tested (see Figure 1.1). Multiple model fit indices were examined to test and modify the model to be statistically acceptable. As a result, the model of Adoption of Mixed Methods was finalized (see Appendix E). Accordingly, the significant predictors that impacted Chinese scholars’ intentions to use mixed methods were identified and estimated. More detailed information about the model test is reported in the chapter of results.

All the above data analysis was conducted in Mplus 6, which provided the maximum likelihood estimation with robust standard errors (MLR) for non-normal continuous variables with missing data. For all variables in the study, there was less than 4% missing data at the assumption of missing at random. To evaluate model fit, I used multiple model fit indices, including model chi-square ($\chi^2$), Bentler comparative fit index (CFI; Bentler, 1990), standardized root mean square residual (SRMR), and Steiger-Lind
root mean square error of approximation (RMSEA; Steiger, 1990).

According to Kline (2011), the combination of chi-square values accompanying \(p\) values greater than .05, CFI values greater than .95, RMSEA values less than .05, and SRMR values less than .08 indicated a good model fit. Other researchers discussed that CFI values between .90 and .95 are acceptable fit (Browne & Cudeck, 1992). The sample size (\(N > 200\)) in the quantitative survey decreased the concerns of power for the study. The effect size of the model and coefficients estimates were evaluated and reported using the \(R^2\)s.

Validation Strategies

Qualitative Phase

Several validation strategies were used during the qualitative data analysis procedure. First, member checking was conducted with each of the three interviewees to ensure the accuracy of data results as well as the translation of the results from Chinese to English. In order to do so, the summary of results was written in both Chinese and English and sent to the participants for review. No misunderstanding was found.

Second, multiple sources of data, including interview reflections, published articles, and relevant documents, were analyzed and triangulated with the interview results during data analysis to improve the validity of data coding and interpretation. Additionally, the computer software, MAXQDA version 10, was used in the inductive coding procedure.

Third, peer debriefing was conducted to confirm the emerged themes. Two faculty members and five doctoral students in the area of qualitative and mixed methods research reviewed and agreed with the results of the case study.
Fourth, I reflected on my role in the qualitative case study phase as the investigator. My Chinese cultural background and academic knowledge of mixed methods may have increased the validity of my data analysis and data interpretation in the study.

**Instrument Development and Validation Analysis Phase**

Panel reviews and sorting were conducted to providesome content and construct evidence of validity before surveying the participants. After the survey, a number of statistics were used to examine the scale scores, including Cronbach’s alpha, Omega, inter-item correlation coefficients, factor loadings, and confirmatory factor analysis.

**Quantitative Phase**

The survey data were believed to be accurate due to the following strategies. First, all participants were invited by the associate deans and/or the program directors at their university. In addition, the administrators assisted me in the entire data collection process. In other words, the invited participants were believed to treat the survey seriously. The response rate of the survey washigh at 91%.

Second, I had discussed with the participants about research methodologies at each time before I handed out the questionnaire to them. Such discussion assured me that participants did not misunderstand the terminology used in the questions.

Third, the data were analyzed in the software of Mplus 6 with advanced statistics. Not only the construct validity of the scale scores of each scale was initially discussed but also the hypothesized model were tested and analyzed before estimating the relationships between variables. The estimated coefficients were standardized in results because the variables in the model have different scales.
Ethical Considerations

Participants’ personal information was kept confidential. Only the investigator had access to the data. All the interview audio-files were deleted because of confidentiality concerns after the transcripts were completed. All paper-based survey data were destroyed after data entry in the electronic file. The electronic file was kept in a locked laptop and will be destroyed after the study is complete. Lastly, only the aggregated information will be reported in the dissertation and published papers. No individuals will be recognized from the report.

Summary

The chapter reports the research design of the study and rationales for using mixed methods. The challenges of exploratory instrument design are generally associated with the instrument development and validation analysis phase, where the researcher might not use the rigorous scale development procedures to develop the instrument. In responding to these concerns, the study made particular efforts at the phase of instrument development and validation analysis. Specifically, I adopted a systematic and comprehensive process, including using literature reviews, qualitative data analysis, panel reviews, sorting, focus group discussion, and a pilot study in the process of instrument development, as well as using advanced statistics analysis in the validation process for the developed instrument.

Lastly, the chapter reports the data collection and data analysis in different phases of the study. The chapter also discusses the validation strategies and ethical considerations. Taken together, the design and implementation of the study help to make the results credible and informative.
CHAPTER IV

RESULTS

Introduction

This chapter reports the results of the three phases in the study: the qualitative case study results, the instrument development results, and the quantitative survey results. The qualitative findings describe how mixed methods is accepted and used in the case of East China, as well as the issues in the adoption process. Built on the qualitative findings, an instrument was developed to measure individuals’ adoption of mixed methods. The chapter presents how the instrument was developed and analyzed using qualitative and quantitative approaches including judges’ reviews, sorting, and confirmatory factor analysis. Finally, the study examines the model statistics and the influential factors of Chinese adoption of mixed methods.

Qualitative Results

Based on the analysis of the multiple sources of qualitative data, a detailed case description of East China was developed. Meanwhile, five themes about the use of mixed methods emerged on the basis of the inductive coding procedure.

Case Description

East China is one of the six major geographical districts in China. The urbanization of the area is medium to high. East China has approximately 30 of the 76 urban cities in the whole of China (xingzheng, n.d.). Containing six provinces and one municipality, East China has a population of approximately 367,610,000, occupying 29% of the entire population in China. (Cnhuadong, 2011)

As to the education in this area, according to the data from the website of
Registration for the College Entrance Exam in 2011 (Rank of Chinese Universities, 2012), East China has 232 out of the 792 full-time comprehensive universities in the country. Moreover, 30 of the 232 universities rank in the top 100 Chinese comprehensive universities (zhongguojiaoyuwang, n.d.).

Hundreds of professors who have overseas academic experiences work in these 30 top universities in East China (renwuku, n.d.). For example, one of the three interviewees in the study graduated from an overseas university and now has been working at one of the top universities in East China. Likewise, many professors in East China have had similar experiences of studying abroad and returning to China to work. Many of them have learned about research methodologies, including mixed methods, from overseas institutions. These professors play a crucial role in expanding mixed methods in China through teaching students and/or conducting mixed methods research with their colleagues.

Since 2008, when the China central government started the “Thousand Expert Plan,” which aims to recruit one thousand outstanding experts with overseas scholarly experiences back to China within five years, East China universities have spent millions of dollars on this plan (difang, n.d.). For example, Zhejiang University in East China has recruited 25 professors with overseas experiences from 2008 to 2010. These professors have not only brought back the advanced knowledge in their disciplines and research projects, but also greatly improved the quality of social and scientific research in East China (zhongguojiaoyuwang, n.d.). In short, East China is well developed in higher education and academic research.

In terms of research institutions, two of the three major Academies of Educational
Sciences in China are located in East China (China Education and Research Network, n.d.). Typically, different academic areas adopt different types of research methodologies as their dominant research approaches. In general, qualitative approaches are dominant in various disciplines of arts, such as education and sociology (Liu, 2009; Tian, 2007). Quantitative approaches are dominant in sciences, including psychology, engineering, health sciences, and information research (Daolun, n.d.; Qi, 2010; Renlei, 2010; Xinlixue, 2011; Zhang & Liu, 2009; Zhang & Wang, 2001).

Inspecting the commentary papers that have been published by Chinese scholars, I found that most the commonly used qualitative approaches across disciplines are observation, interview, documentation, narrative, and qualitative case study designs; whereas the most common quantitative approaches include survey, observation, and experiments (Liu, 2009; Tian, 2007). For example, Liu (2009) in East China reviewed a top journal in education and found that besides using observations and interviews in qualitative studies, Chinese researchers also adopted narrative, qualitative case study, action research, and phenomenology designs. In terms of quantitative studies, survey is used most frequently (48.89%), followed by experiment, observation, and quantitative case study (Liu, 2009). In more recent years, more and more Chinese scholars in either arts or sciences have realized the need and importance of using mixed methods in their disciplines, including psychology, health science, and education (Tian, 2007; Qi, 2010; Zhou & Zhang, 2008).

However, conducting a mixed methods research project usually requires a relatively larger cost and more personnel in investigation than a pure quantitative or qualitative research project. Moreover, research funding for Chinese scholars is very
limited, even in East China, a highly urbanized and economically developed district. Accordingly, the use of mixed methods has been greatly restricted due to funding issues (Report on Chinese Education Development, 2011; Tian, 2007).

Furthermore, according to Tian (2007) as well as interviewees in this study, another reality that hinders the diffusion of mixed methods in China is that many young scholars who intend to conduct mixed methods research are poorly funded. Particularly, senior investigators have much larger opportunities to obtain the financial support than young scholars. Yet, senior scholars are normally conservative about using any new methodology, such as mixed methods. In contrast, young scholars who accept mixed methods barely have the opportunity to get funded for their proposed mixed methods projects. Thus, few mixed methods research studies have been funded and conducted in the past decade (Liu, Feng, & Li, 2007; Tian, 2007; Zhang & Wang, 2001).

However, in the past three years, East China governments have advocated that the funding application should be open to all scholars, especially to outstanding young researchers. The governments have also actively sought a wide range of funding resources from local agents and businesses. With government support and encouragement, as of 2010, a number of mixed methods projects have been funded in East China.

**Themes About Issue of Use**

Five themes about the issue of the use of mixed methods in China were generated after analyzing and triangulating multiple sources of data in the case study, including three individual interviews, eighteen commentary papers on the use of mixed methods in specific disciplines, six published mixed methods articles, 36 theses and dissertations that
used mixed methods, and 22 documents of public governmental reports and news clips. The five themes are (1) why mixed methods is adopted (2) the adopted designs of mixed methods research, (3) the current status of the use of mixed methods in China, (4) the ways of improving the use, and (5) the context of China.

**Theme 1: Why mixed methods is adopted.** The results indicated two major reasons why Chinese scholars have adopted mixed methods. First, Chinese scholars realize that either qualitative or quantitative methodology has its unique weaknesses in explaining a complex research phenomenon. Combining the two types of approaches could make them complete each other and thus provide a comprehensive understanding (Huang & Xiang, 2008; Liu, et al., 2007; Liu & Liu, 2010; Tian, 2007). For example, some commentary papers on the use of mixed methods in East China mentioned (translation), “qualitative approach could provide thick description about the quantitative numbers.” (Hou, 2007; Qi, 2010; You, 2010; Zhou & Zhang, 2008) Therefore, mixed methods is used for a comprehensive understanding.

Second, the complexity of the research phenomena in Social Sciences and Education usually requires multiple research methods (Liu & Liu, 2010; Yang, Lam, & Wong, 2010; Jiang, 2008; You, 2010). Accordingly, mixed methods is used by those researchers who intend to investigate complex phenomena. One education specialist during the interview said (translation), “the issues in education are various in different contexts with different participants at different schools. The situations are so diverse and complicated that a single research approach for the investigation is far away not enough.”

The above two rationales of using mixed methods were supported by Creswell and Plano Clark (2011), who claimed the combination of qualitative and quantitative data
could provide a more complete understanding than either approach by itself.

Moreover, these two rationales also fit the pragmatic worldview for guiding mixed methods research. The focus of pragmatism is on the consequences and on the primary research purpose rather than on the method. Pragmatism claims to use what works and to use multiple methods to inform the problem under study. In short, pragmatism is pluralistic and oriented toward what works and practices (Tashakkori and Teddlie, 2003). Taken together, both the previous literature and philosophical stances have confirmed the identified needs of using mixed methods by Chinese scholars. Later in the study, a new scale (Reasons to Use Mixed Methods) was developed on the basis of this qualitative theme. More detailed information is reported in the discussion chapter (see Table 5.1 and Table 5.2).

**Theme 2: The adopted designs of mixed methods research.** One of the major interests of the case study is about what types of mixed methods research designs are adopted by Chinese scholars, including what qualitative and quantitative approaches are most commonly used, and what designs are adopted.

*Adopted qualitative approaches.* Inspecting the 36 mixed methods dissertations and the six published journal articles on mixed methods research, I found the most used qualitative approaches by Chinese researchers include observation, individual interview, focus group discussion, document analysis, comparative study, field study, and the qualitative case study design (Kim, et al., 2010; Long, et al., 2008).

*Adopted quantitative approaches.* In terms of the most used quantitative approaches by Chinese scholars, the results indicated that survey, experiment, and instrument development, and the quantitative case study design are most popular (Kim, et
al., 2010; Li, et al., 2007; Long, et al., 2008; Luo, Hu, & Sun, 2010; Yang, Lam, & Wong, 2010). As for the software for data analysis, Chinese scholars usually use the EXCEL, SPSS, and SAS for statistical analysis. The most common analysis include descriptive statistics, such as percentage, and inferential statistics, such as regressions, t-test, and chi-square tests (Kim, et al., 2010; Li, et al., 2007; Long, et al., 2008; Luo, et al., 2010; Yang, et al., 2010; Zhou & Zhang, 2008).

**Adopted mixed methods designs.** Most of the mixed methods theses and dissertations use the convergent parallel mixed methods design. Few of the studies adopt sequential or embedded mixed methods designs. None of these studies use a more complicated mixed methods design, such as an embedded design or a multistage design.

By contrast, the six published journal articles reveal the usages of diverse mixed methods research designs, including the variants of convergent design (e.g. data transformation design) and two types of sequential mixed methods designs: explanatory and exploratory designs (Kim, et al., 2010; Li, et al., 2007; Long, et al., 2008; Luo, et al., 2010; Yang, et al., 2010; Zhou & Zhang, 2008). That said, journal article authors are more experienced than graduate students in using different mixed methods designs.

Specifically, three of the six published journal articles use the convergent parallel mixed methods designs. Long et al. (2008) examined the factors influencing the delays for migrants in receiving a TB diagnosis in urban China through combining the data from a survey and focus groups. Li et al. (2008) investigated health-service providers’ attitudes and practices regarding the HIV notification process in China. Luo, Hu, and Sun (2010) studied the teacher-student relationship in undergraduate education through combining the results of a survey and individual interviews.
The other three published mixed methods articles adopted the sequential mixed methods designs. Yang, Lam, & Wong (2010) used the exploratory sequential design to develop an instrument for investigating Chinese teachers’ beliefs about education. Kim et al. (2010) explored the relationship between gender and income inequality in the urban China through converging the results of a survey and follow-up interviews. Zhou and Zhang (2008) gave an example of the exploratory sequential design in psychology to examine teachers’ characteristics. The researchers first analyzed the qualitative interview data and then transformed the qualitative data to quantitative numbers for statistical analysis.

**Mixing strategies.** As the above three convergent parallel mixed methods studies show, Chinese scholars compared the qualitative and quantitative results from two different strands and provided a more comprehensive understanding of the research phenomenon, such as gender and income (Li, et al, 2007). In the other two exploratory sequential studies (Yang, Lam, & Wong, 2010; Zhou & Zhang, 2008), Chinese scholars built the follow-up phase to the initial phase to generalize the initial qualitative results to a larger sample or to explain the initial quantitative results with details. In the explanatory sequential research (Luo, Hu, & Sun, 2010), the researchers built the follow-up phase to the initial phase to explain the initial quantitative results with details.

Taken together, the three types of mixed methods designs — the convergent parallel design, the explanatory sequential, and the exploratory sequential design — are the most common mixed methods designs used by Chinese (see Table 4.9). Moreover, Chinese researchers are likely to choose the convergent parallel design for a comprehensive understanding and to use the exploratory sequential designs for
instrument development (Huang & Xiang, 2008; Jiang, 2008; Liu, et al., 2007; Liu & Liu, 2010; Tian, 2007). According to Creswell and Plano Clark (2011), the instrument development design is a common variant of exploratory sequential designs with the emphasis on the second phase, a quantitative phase. Most of the time, Chinese scholars choose this variant design from a pragmatic stand due to the lack of existing measures. They use the instrument design when their research aims to develop an instrument based on the qualitative results at the first phase and then tested the instrument at the following quantitative phase. Lastly, very few Chinese researchers have used a more advanced design, such as the embedded design or multistage mixed methods design. This is probably because not many Chinese scholars have the adequate knowledge and skills to use the advanced mixed methods designs.

In short, the theme describes the use of qualitative methods, quantitative methods, and the designs and conducting of mixed methods research. Later in the study, the scale of Experience and the scale of Self-efficacy with mixed methods were developed based on the information from this theme. Under the scale of Experience, three subscales were developed regarding individuals’ contact with qualitative approaches, contact with quantitative approaches, and contact with mixed methods. More detailed information is reported in the discussion chapter (see Table 5.1 and Table 5.2).

Table 4.9

<table>
<thead>
<tr>
<th>Examples of mixed methods research in China</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Six Published Mixed Methods Articles</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discipline</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Public health</td>
</tr>
<tr>
<td>(TB diagnosis for migrants)</td>
</tr>
</tbody>
</table>
### Examples of Mixed Methods Theses and dissertations

<table>
<thead>
<tr>
<th>Discipline</th>
<th>MM Design</th>
<th>Quan</th>
<th>Qual</th>
<th>Institute</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language (English learning)</td>
<td>Embedded</td>
<td>Experiment</td>
<td>diary</td>
<td>Chongqing</td>
<td>2009</td>
</tr>
<tr>
<td>Education (vocabulary learning)</td>
<td>Sequential</td>
<td>Survey, experiment</td>
<td>interview</td>
<td>Hubei</td>
<td>2008</td>
</tr>
<tr>
<td>Language (English learning)</td>
<td>Convergent</td>
<td>Survey, experiment</td>
<td>interview</td>
<td>Hunan</td>
<td>2007</td>
</tr>
<tr>
<td>Education (vocabulary learning)</td>
<td>Convergent</td>
<td>Survey, experiment</td>
<td>interview</td>
<td>Hebei</td>
<td>2007</td>
</tr>
<tr>
<td>Education (vocabulary learning)</td>
<td>Convergent</td>
<td>Survey, experiment</td>
<td>interview</td>
<td>Nanjing</td>
<td>2005</td>
</tr>
<tr>
<td>Language (English learning)</td>
<td>Convergent</td>
<td>survey</td>
<td>interview</td>
<td>Nanjing</td>
<td>2004</td>
</tr>
</tbody>
</table>

*Note: information about the data is available on request*

**Theme 3: Current status of the use.** The use of mixed methods is at the
beginning stage in China. According to the interviewees, Chinese scholars are too excited about the advantages of using mixed methods to consider the potential challenges and practical issues in practice. For instance, when participants discussed the perceived advantage of using mixed methods, they showed positive attitudes, such as “definitely superior to” and “most advanced.” In contrast, when they were asked about the perceived challenges of using mixed methods, they used many uncertain words, including “possible” and “maybe,” to describe the expected difficulties.

One of the other biggest problems is that many Chinese investigators are not proficient in quantitative and qualitative approaches. One interviewee said, “many scholars in education, where qualitative approaches are the dominant methodology, were actually poor at qualitative coding.” In addition to the insufficient techniques, many scholars are short in the knowledge of mixed methods research designs regarding the priority, timing, mixing, and interaction. For instance, in the published articles, few authors discuss the strategies of how they mixed the two different types of data and designed the two strands in a systematic way in their studies. In short, Chinese scholars are not proficient in the two traditional types of research methods nor do they have a sufficient understanding of mixed methods designs. Accordingly, it is hard for them to effectively integrate quantitative and qualitative approaches and conduct a high-quality mixed methods research study.

Moreover, logistical issues are the other problems that have hindered the use of mixed methods in China. For example, mixed methods research usually require a relatively heavier workload and a larger cost in an investigation than a pure qualitative or quantitative research, but few Chinese universities and research institutions could provide
the enough funding to support a mixed methods project (Liu, Feng, & Li, 2007; Tian, 2007; Zhang & Wang, 2001). Although Chinese governments have claimed to increase the investments on higher education, most of the funding has been used to develop the basic school facilities and technologies (Report of Chinese Education Development, 2011).

Lastly, publication is another issue. Given that mixed methods has been adopted in China only in the past several years, many publishers and editors have not quite accepted mixed methods papers. As one interviewee said as a representative of editors, “we (Chinese scholars) are still questioning about the philosophical foundations of mixed methods research, such as the paradigm incompatibility.” He added, “We need more understanding and reflections on the philosophical foundations of mixed methods research before we use it. We have to persuade others to believe the viability and the value of using mixed methods in research.”

The theme represents the barriers to doing mixed methods research for Chinese scholars, including the insufficient expertise, logistical issues, and practical problems. Later in the study, a scale of Barriers was developed based on the information from this theme. However, the scale was not found valid and reliable according to the data analysis in survey.

**Theme 4: Ways of improving the use.** Course learning and practical work are the two major ways to expand scholars’ experiences with using mixed methods in China. Methodology courses are available in many Chinese universities to the students who desire the knowledge and skills in doing quantitative and qualitative research (Liu, et al., 2007; Tian, 2007; Zhang & Wang, 2001). In the past ten years, many scholars with
overseas experiences in academics returned to China with the knowledge of multiple methods (jiaqiang, n.d.; zhongguo jiaoyuwang, n.d.). This group of scholars has greatly contributed to the expansion of mixed methods in China through opening courses of mixed methods to students, conducting and publishing mixed methods research, and encouraging their graduate students to use multiple methods in thesis and dissertation writing. For example, one interviewee opened a course of mixed methods research at his university. He used Creswell’s (2008) Research Design as the textbook along with his own research experiences to educate his students. The participant also expressed that there have been more and more Chinese scholars teaching back in China after graduating from overseas universities. These scholars have formed an association of research methods (Wanjuan Methods Association) aimed to enhance Chinese scholars’ research expertise.

Moreover, practical work is another important way for Chinese scholars to improve their expertise in using mixed methods. Scholars with different techniques cooperate with each other to conduct mixed methods projects (Huang & Xiang, 2008; Tian, 2007). Through teamwork, they can learn from others, improve their understanding of mixed methods, and gain the empirical experiences of doing mixed methods research. Examining the published mixed methods articles in China, I found that the average number of authors for these studies is more than three. In addition to the evidence of co-authorship, the interview also verified my conclusion of Chinese scholars’ collaboration. One participant said, “Chinese scholars paid more attention to this newly emergent methodology and actively sought cooperation with other scholars with a different expertise since the appearances of the Handbook of Mixed Methods Social and
Behavioral Research in 2003 and the Journal of Mixed Methods Research (JMMR) in 2007.” Such statement not only indicates how Chinese scholars work together on mixed methods research, but also implies how the mixed methods publications impact Chinese scholars’ acceptance and use of mixed methods.

Lastly, according to the public media documents, a number of libraries at Chinese universities subscribe to and translated the most famous mixed methods books and journals, such as the Journal of Mixed Methods Research (JMMR). For example, Fudan University and Zhejiang University in East China have subscribed the JMMR since 2007. Furthermore, in order to make more Chinese scholars improve their knowledge of and skills in research methodology, Chongqing University Press has published a series of methodology books and has translated several popular mixed methods books into Chinese in the past ten years, including Tashakkori and Teddlie (1998), Creswell and Plano Clark (2006), and others.

In short, Chinese scholars have advocated and supported the use of mixed methods across disciplines through taking mixed methods courses, cooperating with others in mixed methods research projects, and subscribing to and translating mixed methods books and journals to learn about mixed methods. The information from this theme helped with the development of the scale of Experience with mixed methods in the instrument phase of the study.

Theme 5: The context of China. The context for the use of mixed methods in China includes what disciplines have adopted mixed methods, what journals have accepted and published mixed methods papers, and who has been the population using mixed methods in China (see the sample in Table 4.9).
Disciplines. Examining the commentary papers on mixed methods, I found this method has been used in the following fields of management, higher education, educational technology, long-distance education, sociology, and nursing since 2001. In addition to the above fields, the six published mixed methods articles also indicate the use of mixed methods in public health, psychology, and social sciences (Kim, et al., 2010; Li, et al., 2007; Long, et al., 2008; Luo, Hu, & Sun, 2010; Yang, Lam, & Wong, 2010; Zhou & Zhang, 2008). Additionally, one interviewee discussed the use of mixed methods in the discipline of early childhood. She said:

Traditionally, early childhood education research largely depended on quantitative approaches, but nowadays, more and more scholars in this area combined qualitative approaches in research to understand children’s behaviors and psychological well-being.

Journals. The journals that have published mixed methods papers were mostly related to the disciplines of education and psychology, including the Studies in Preschool Education, Higher Education Research, Modern Educational Technology, Education for Chinese After-school, Modern Education Management (translation), and Advances in Psychological Science. Chinese scholars have also published their mixed methods studies in overseas journals, such as the BMC Health Services Research. The six journal articles and a number of graduate students’ theses cited in this study were written during the period of 2007-2010, which implies that mixed methods has been gradually accepted in the recent years in China.

Authors. All the commentary papers and published journal articles collected in the study have Chinese scholars as the first authors, except for the one with Chinese
scholars as the second and third authors. In inspecting the published studies as well as the theses/dissertations, I found that most of the Chinese who are using mixed methods are from Chinese universities and academic research institutes. That said, at the current stage in China, mixed methods has mainly been accepted and used by Chinese faculty members from higher education institutions as well as their graduate students. Therefore, this group of people was chosen as the sample of survey in the study.

To sum up, the qualitative case study findings reveal that Chinese scholars have adopted mixed methods in certain fields in recent years. The basic mixed methods research designs, such as convergent parallel designs and sequential mixed methods designs, are more likely to be used in China compared with the advanced designs, such as embedded or transformative designs. Moreover, due to insufficient knowledge and skills of methodology, many Chinese scholars rarely integrate qualitative and quantitative methods effectively. Few studies have reported how researchers merged or connected the qualitative and quantitative phases. Thus, it is hard to evaluate the persuasiveness and validation of their mixed methods projects. In short, there is still a process for Chinese scholars to thoroughly understand the design and conduction of rigorous mixed methods research.

**Instrument Development and Validation Analysis**

In the study, thirteen scales were initially generated to measure the adoption of mixed methods based on the qualitative findings (see Table 3.3). The major process of item generation included the conversion of qualitative themes to scales and the conversion of codes/quotes to items, which was adapted from Creswell and Plano Clark’s (2011) instructions of instrument development (codes becoming variables and quotes
becoming items.) More detailed information is discussed in the discussion chapter.

After the item generation, the scales were tested in a pilot study. As reported in the method chapter, two scales were removed after the pilot study. Next, the retained eleven scales were used to collect the quantitative data of Chinese scholars’ adoption of mixed methods. Then, the survey data were examined for the reliability and validity of the scale scores before putting them in the model analysis. As reported in the method chapter, three scales were removed from the model analysis due to the poor psychometric properties (see Table 3.3).

In the end, the item responses of eight scales were used in the model analysis of the study. The eight scales are the Contact with Qualitative Methods, Contact with Qualitative Methods, Contact with Mixed Methods, Intention to Use, Relative Advantage, Ease of Use, Compatibility, and Reasons to Use. The whole instrument with the above eight scales was reported in the Appendix J. In the following sections, I report the instrument development results for the eight scales.

**Sorting Results for Instrument Development**

Sorting was conducted before the administration of the survey. In the two rounds of sorting, judges were asked to place the random-ordered items into the categories (scales). As one of the inter-rater agreement indices, the hit ratios of item placement at the two sorting rounds are reported in Table 4.1 and Table 4.2. The hit ratio is an indicator of inter-rater agreement with the item-scale relationship because it indicates how many items were placed correctly in the target category by the judges (Moore and Benbasat, 1991; 2001). In addition to the hit ratio, another two inter-rater agreement indices, namely, the raw inter-rater agreement and Cohen’s Kappa coefficients were also
calculated for the second round of sorting results (see Table 4.3). In general, all the statistics indicated that the judges highly agreed with the item-scale relationships for the eight scales.

**Sorting results for the scales: Contact with Qualitative/Quantitative/Mixed Methods.** The items of the three scales shared the same major stems of questions about participants’ contact with research methodologies. For instance, “How many conferences did you attend to learn about this methodology?” Then three sub-stems were provided as “Qualitative methodology? Quantitative methodology? Mixed methods?” Participants responded to the three questions separately. In contrast, in the sorting procedure, judges only reviewed the major stems of the questions.

Three judges conducted the first-stage sorting procedure. They sorted the items to the labeled categories, gave the definition to each category, and rated each item’s representativeness of its category on a 10-point scale. According to Moore and Benbasat (1991; 2001), the hit ratio is calculated using the actual placements dividing the target placements. The target placements were theoretically the results of the number of items multiplying the number of judges. For instance, the target placements of an eight-item scale by three judges should be 24.

In the first round of sorting, there were eight questions. As Table 4.1 indicated, the hit ratio was as high as .96, using the actual hits of 23 dividing by the target placements of 24 (see Table 4.1). Moreover, the average rating score across the items was 7.5 out of 10. Judges’ definitions about the construct were consistent, such as the experiences, skills, and contact with the methodology. Although the items were highly rated by the judges, one of the judges suggested combining some similar items to reduce
the redundancy. Accordingly, I combined shortened the scale from eight sets of items to six sets of items (18 items in total: 6 items for each type of research methods).

The second run of sorting was conducted by another two judges with the revised scale of six sets of items. The hit ratio, raw agreement, and Cohen’s Kappa were examined for the inter-rater reliability and reported in Table 4.2 and 4.3. Overall, the inter-rater agreement was high for the construct, with the hit ratio of .92, the raw agreement of .96, and the Cohen’s Kappa of .80 (see Table 4.3). Furthermore, the average rating across the items was 8.5 out of 10. In all, the sorting results provided some content evidence of validity.

Table 4.1

*Item Placement Hit Ratios of the First Round of Sorting*

<table>
<thead>
<tr>
<th>Actual Categories</th>
<th>Target Categories</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Total</th>
<th>Hits Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contact</td>
<td>23</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.96</td>
<td></td>
</tr>
<tr>
<td>2. Intention</td>
<td>9</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>3. Advantages</td>
<td>20</td>
<td>1</td>
<td>2</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td>4. Ease Use</td>
<td>14</td>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.78</td>
<td></td>
</tr>
<tr>
<td>5. Compatibility</td>
<td>2</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.67</td>
<td></td>
</tr>
<tr>
<td>6. Reasons</td>
<td>2</td>
<td>2</td>
<td>7</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td>.78</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.2

*Item Placement Hit Ratios of the Second Round of Sorting*

<table>
<thead>
<tr>
<th>Actual Categories</th>
<th>Target Categories</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>Total</th>
<th>Hits Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contact</td>
<td>11</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.92</td>
<td></td>
</tr>
<tr>
<td>2. Intention</td>
<td>6</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>3. Advantages</td>
<td>10</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>4. Ease Use</td>
<td>3</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.37</td>
<td></td>
</tr>
<tr>
<td>5. Compatibility</td>
<td>5</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.83</td>
<td></td>
</tr>
<tr>
<td>6. Reasons</td>
<td>9</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.3

*Inter-judge Agreements of the Sorting*

<table>
<thead>
<tr>
<th>Agreement Measures</th>
<th>Round 1</th>
<th>Round 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hits Ratio</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact</td>
<td>.96</td>
<td>.92</td>
</tr>
<tr>
<td>Intention to Use</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Relative Advantages</td>
<td>.83</td>
<td>1.00</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>.78</td>
<td>.37</td>
</tr>
<tr>
<td>Compatibility</td>
<td>.67</td>
<td>.83</td>
</tr>
<tr>
<td>Reasons</td>
<td>.78</td>
<td>1.00</td>
</tr>
<tr>
<td><strong>(Average of Hits Ratio)</strong></td>
<td><strong>.84</strong></td>
<td><strong>.80</strong></td>
</tr>
<tr>
<td><strong>Raw Agreement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact</td>
<td>.96</td>
<td></td>
</tr>
<tr>
<td>Intention to Use</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Relative Advantages</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Ease of Use</td>
<td>.96</td>
<td></td>
</tr>
<tr>
<td>Compatibility</td>
<td>.98</td>
<td></td>
</tr>
<tr>
<td>Reasons</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td><strong>(Average Raw Agreement)</strong></td>
<td><strong>.98</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Cohen’s Kappa</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact</td>
<td>.80</td>
<td></td>
</tr>
<tr>
<td>Intention to Use</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Relative Advantages</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Ease of Use</td>
<td>.65</td>
<td></td>
</tr>
<tr>
<td>Compatibility</td>
<td>.82</td>
<td></td>
</tr>
<tr>
<td>Reasons</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td><strong>(Average Cohen’s Kappa)</strong></td>
<td><strong>.87</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Sorting results for the scale of Intention to Use.** The scale consists of three items adapting from Venkatesh et al.’s (2003) scale. In the first round of sorting by three judges, the target placements should be 9 (= 3 items * 3 judges). The actual hits were 9 so that the hit ratio of this scale was perfect at 1.00 (see Table 4.1). Moreover, the average rating score across the items of the scale was as high as 8.5 out of 10. Judges’ definitions on the scale were consistent, such as the intention and plan of using the methodology. Given the high inter-rater agreement, no change was made for the items after the first round of sorting.
Another two judges conducted the second run of sorting. The hit ratio, raw agreement, and Cohen’s Kappa were examined for the inter-rater reliability. All of the three types of reliability coefficients were 1.00 (see Table 4.3). Additionally, the average rating across the items was perfect at 10. These results provide some evidence for the scale reliability and validity.

**Sorting results for the scale of Relative Advantage.** The scale was adapted from Moore and Benbasat’s (1991; 2001) scale, with a long version of eight items and a short version of five items. The long-version scale was used in the first round of sorting. The target placements should be 24 (= 8 items * 3 judges). With the actual 20 placements, the hit ratio of this scale was satisfactory at .83 (see Table 4.1). Moreover, the average rating score across the items of the scale was 6.5 out of 10. The three judges defined the scale as efficient and positive impacts of using the mixed methods. The short version consisted five of the eight items. In the first round of sorting, the hit ratio of the short version was even higher, at .87. The average rating scores across the items of the short version was also higher, at 7.5. Accordingly, the short version was used in the second round of sorting.

Another two judges conducted the second run of sorting. The hit ratio, raw agreement, and Cohen’s Kappa were examined for the inter-rater reliability. All of the three types of reliability coefficients were 1.00 (see Table 4.3). Additionally, the average rating across the items was at 8.0 out of 10. All the results provide good evidence for the scale reliability and validity.

**Sorting results for the scale of Ease of Use.** The scale was adapted from Moore and Benbasat (1991; 2001) scale, with a long version of six items and a short version of
four items. The long-version scale was used in the first round of sorting. The total placements should be 18 (= 6 items * 3 judges). With the actual hits of 14, the hit ratio of this scale was .78 (See Table 4.1). Moreover, the average rating score across the items of the scale was 8.5 out of 10. The short version consisted four items. The hit ratio of the short version was 1.00. The average rating scores across the items of the short version was 9. Accordingly, the short version of the scale was used in the second round of sorting.

Another two judges conducted the second run of sorting. The hit ratio, raw agreement, and Cohen’s Kappa were examined for the inter-rater reliability. Although the hit ratio was low at .37 because the judges put some items into another category, the other inter-rater reliability indices were good. The raw agreement of this scale was as high as .96, and the Cohen’s Kappa was also good at .65 (see Table 4.3). Moreover, the average rating across the items was 8 out of 10. All the results provide good evidence for the scale reliability and validity. Taken together, the short version of the scale was used in the survey.

**Sorting results for the scale of Compatibility.** The scale was adapted from the Moore and Benbasat (1991; 2001) scale, with a long version of four items and a short version of three items. The long-version scale was used in the first round of sorting. The total placements should be 12 (= 4 items * 3 judges). With the actual hits of 9, the hit ratio of this scale was .67 (see Table 4.1). Moreover, the average rating score across the items of the scale was 8 out of 10. Judges’ definitions were all about the compatibility of using mixed methods in the current work. The short version consisted of three of the four items. The hit ratio of the short version was also .67 according to the first round of
sorting results. The average rating scores across the items of the short version was 9. Accordingly, the short version of the scale was used in the second round of sorting.

Another two judges conducted the second run of sorting. The hit ratio, raw agreement, and Cohen’s Kappa were examined for the inter-rater reliability. All indices were good, with the hit ratio of .83, the raw agreement of .98, and the Cohen’s Kappa at .79 (see Table 4.3). Moreover, the average rating across the items was 9.5 out of 10. All the results provide good evidence for the scale reliability and validity.

**Sorting results for the scale of Reasons to Use.** The scale was newly developed based on the qualitative findings and literature reviews. It consists of three items. The sample items include “using mixed methods can solve complex research problems.” Participants were asked to indicate their agreement with the item statements on a 7-likert scale.

The total placements should be 9 for the first round of sorting (= 3 items * 3 judges). With the actual hits of 7, the hit ratio of this scale was good at .78 (See Table 4.1). Moreover, the average rating score across the items of the scale was 8 out of 10. The three judges defined the scale as the needs, rationales, and reasons to use mixed methods. Thus, no change was made after the first round of sorting.

Another two judges conducted the second run of sorting. The hit ratio, raw agreement, and Cohen’s Kappa were all good at 1.00 (see Table 4.2 and Table 4.3). Additionally, the average rating across the items was 9.5 out of 10. All the results provide good evidence for the scale reliability and validity.

To sum up, all the inter-rater agreement indices of the above scales were satisfactory and provide the content evidence of validity for the instrument. The average
hit ratio across scales was .84 in the first round of sorting, and .80 in the second round of sorting. The average raw agreement was .98. Lastly, the average Cohen’s Kappa was .87 (see Table 4.3).

**Confirmatory Factor Analysis for Scale Reliability and Validity**

Before testing the hypothesized path analysis model of the study, the measurement model analysis is necessary to ensure the scale scores were reliable and valid to be used. Confirmatory factor analysis was used in the study, including two steps: (1) the measurement model for each scale and (2) the overall measurement model for the entire instrument with all eight scales. The sample size was 247.

The eight scales were the *Contact with Qualitative Methods*, *Contact with Quantitative Methods*, *Contact with Mixed Methods*, *Intention to Use*, *Relative Advantages*, *Ease of Use*, *Compatibility*, and *Reasons to Use*. Each scale was assumed to be unidimensional so that the one-factor measurement model was used to fit the data. The validity indices and the internal reliability were estimated and reported as follows.

**The measurement model for the scale of Contact with Qualitative Methods.**

This scale consisted of six items. The measurement model examined 18 parameters, including 6 factor loadings, 6 intercepts, and 6 residual variances. The degree of freedom was 9. The survey data fit the measurement model acceptably, with the $\chi^2$ (9) = 58.42, $p < .001$; CFI = .91; RMSEA = .10; 90% CI = [.10, .12]; SRMR = .08. That said, the one-factor structure of the construct fit the data, which provided some construct evidence of validity for the scale. Moreover, in terms of the internal reliability indices, the Cronbach’s $\alpha$ was .78, and the Omega coefficient was .79. Omega is another index of scale reliability. It also assumes the unidimensionality of a scale. In contrast to the
Cronbach’s $\alpha$, Omega does not assume equal factor loadings for the items and also consider the error covariance between items (McDonald, 1999). That said, if Omega is much higher than $\alpha$, it suggests that the items of the scale are not equally good to measure the construct. Then, the item information should be included in data analysis. On the contrary, if the two reliability coefficients are close to each other, it indicates that all the items in the scale could be considered equally good to measure the construct. Thus, it is reasonable to use the sum scores of the scale and ignore the item information. In the study, both Cronbach’s alpha and Omega coefficients were estimated for each scale (Table 4.4). It turned out that the two reliability indices were close to each other for all the eight scales of the final instrument. Therefore, the study used the scale scores in the model analysis. Specifically, the mean across items of the scale served as the outcomes of one exogenous variable in the hypothesized model (see Figure 1.1).

Table 4.4

*Internal Reliability Coefficients of the Eight Scales*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Number of Items</th>
<th>Cronbach’s $\alpha$ Reliability Coefficient</th>
<th>Omega Reliability Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with Qualitative Methods</td>
<td>6</td>
<td>.78</td>
<td>.79</td>
</tr>
<tr>
<td>Contact with Quantitative Methods</td>
<td>6</td>
<td>.79</td>
<td>.79</td>
</tr>
<tr>
<td>Contact with Mixed Methods</td>
<td>6</td>
<td>.79</td>
<td>.83</td>
</tr>
<tr>
<td>Intention to Use</td>
<td>3</td>
<td>.81</td>
<td>.82</td>
</tr>
<tr>
<td>Relative Advantage</td>
<td>5</td>
<td>.85</td>
<td>.85</td>
</tr>
<tr>
<td>Ease of Use</td>
<td>4</td>
<td>.73</td>
<td>.75</td>
</tr>
<tr>
<td>Compatibility</td>
<td>3</td>
<td>.80</td>
<td>.80</td>
</tr>
<tr>
<td>Reasons to Use</td>
<td>3</td>
<td>.88</td>
<td>.88</td>
</tr>
</tbody>
</table>

The measurement model for the scale of Contact with Quantitative Methods.

This scale also consisted of six items. The measurement model examined 18 parameters. The survey data fit the measurement model well, with the $\chi^2_{(9)} = 19.45$, $p = .02$; CFI = .98;
RMSEA = .07, 90% CI = [.03, .10]; SRMR = .06. That said, the one-factor structure of the construct fit the data, which provided some construct evidence of validity for the scale. In terms of the internal reliability indices, the Cronbach’s α and Omega was both good at .79. Accordingly, the mean across items served as the outcomes of another exogenous variable in the hypothesized model.

The measurement model for the scale of Contact with Mixed Methods. This scale consisted of six items. The measurement model examined 18 parameters. The survey data fit the measurement model acceptably, with the $\chi^2(9) = 44.91, p<.001; \text{CFI} = .97; \text{RMSEA} = .10, 90\% \text{ CI} = [.09, .11]; \text{SRMR} = .05$. That said, the one-factor structure of the construct fit the data, which provided some construct evidence of validity for the scale. In terms of the internal reliability indices, the Cronbach’s α was .79, and the Omega coefficient was .83. Given that the two reliability coefficients were both good and close to each other, the mean across items served as the outcomes of one endogenous variable in the path model.

The measurement model for the scale of Intention to Use. This scale only consisted of three items so that the measurement model was a saturated model that fit the data perfectly. In terms of reliability, the Cronbach’s α was .81. The Omega reliability coefficient was .82. Accordingly, the mean across items served as the outcomes of another exogenous variable in the hypothesized model.

The measurement model for the scale of Relative Advantage. The scale consisted of five items. The measurement model examined 15 parameters, including 5 factor loadings, 5 intercepts, and 5 residual variances. The degree of freedom was 5. The survey data fit the one-factor model acceptably, with the $\chi^2(5) = 28.22, p<.01, \text{CFI} = .92,$
RMSEA = .10, 90% CI = [.09, .11], SRMR = .05. That said, the one-factor structure of the construct fit the data, which provided some construct evidence of validity for the scale. Moreover, the Cronbach’s α and Omega reliability coefficients were both good at .85. Accordingly, the mean across items of the scale served as the outcomes of another endogenous variable in the hypothesized model.

The measurement model for the scale of Ease of Use. The scale consisted of four items. This scale consisted of six items. The measurement model examined 12 parameters, including 4 factor loadings, 4 intercepts, and 4 residual variances. The degree of freedom was 2. The survey data fit the one-factor model well, with the indices $\chi^2_{(2)}=4.25, p<.12; \text{CFI}=.98; \text{RMSEA} = .06, 90\% \text{CI} = [.00, .10]; \text{SRMR} = .02$. That said, the one-factor structure of the construct fit the data, which provided some construct evidence of validity for the scale. Moreover, the Cronbach’s α reliability coefficient was acceptable, at .73. The Omega was .75. Given the above acceptable validity and reliability indices, the mean across items of the scale served as the outcomes of another exogenous variable in the hypothesized model.

The measurement model for the scale of Compatibility. The scale only consisted of three items so that the measurement model was a saturated model that fit the data perfectly. That said, the one-factor structure of the construct fit the data, which provided some construct evidence of validity for the scale. Moreover, the Cronbach’s α and Omega reliability coefficient were both good at .80. Accordingly, the mean across items of the scale served as the outcomes of another exogenous variable in the hypothesized model.

The measurement model for the scale of Reasons to Use. The scale only
consisted of three items so that the measurement model was a saturated model that fit the data perfectly. The Cronbach’s $\alpha$ and Omega reliability coefficients were both .88. Thus, the mean across items of the scale served as the outcomes of another exogenous variable in the hypothesized model.

**The overall measurement model of the instrument with eight scales.** After examining the structure for each scale, I put the eight retained scales into an overall measurement model (see Figure 4.1) (N=247). The model estimated 136 parameters, including 36 factor loading, 36 intercepts, 36 residuals, and 28 covariance. The model fit the data acceptably, $\chi^2(566)=1926.90$, $p<.001$; CFI = .91; RMSEA = .09; 90%CI = [.09, .10]; SRMR = .09. One of the limitations of the overall measurement model was due to the small ratio of the number of observations per parameter (N:q).

*Figure 4.1* The Measurement Model of the Instrument with Eight Scales
According to Jackson (2003) and Kline (2011), the suggested N:q ratio should be greater than 10:1. Unfortunately, the ratio in the overall measurement model was smaller than 2:1, which might result an error of estimation and affect some measures of model fit. Thus, the future study was necessary to include at least 1,360 participants to reexamine the overall measurement model, especially for the covariance between the eight scales.

Besides the model fit, the model results also indicated the standardized factor loadings. As the Table 4.5 showed, the standardized factor loadings were high within each of the scales, which provided some internal evidence of validity for the scales.

Table 4.5

*Standardized Factor Loadings*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Item</th>
<th>Std. Estimate</th>
<th>S.E.</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with Qualitative Methods</td>
<td>I5A</td>
<td>.49</td>
<td>.09</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I6A</td>
<td>.66</td>
<td>.09</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I7A</td>
<td>.93</td>
<td>.03</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I8A</td>
<td>.95</td>
<td>.03</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I9A</td>
<td>.81</td>
<td>.14</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I10A</td>
<td>.48</td>
<td>.14</td>
<td>.00</td>
</tr>
<tr>
<td>Contact with Quantitative Methods</td>
<td>I5B</td>
<td>.33</td>
<td>.13</td>
<td>.01</td>
</tr>
<tr>
<td></td>
<td>I6B</td>
<td>.82</td>
<td>.10</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I7B</td>
<td>.98</td>
<td>.02</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I8B</td>
<td>.87</td>
<td>.08</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I9B</td>
<td>.87</td>
<td>.10</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I10B</td>
<td>.84</td>
<td>.13</td>
<td>.00</td>
</tr>
<tr>
<td>Contact with Mixed Methods</td>
<td>I5C</td>
<td>.74</td>
<td>.15</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I6C</td>
<td>.87</td>
<td>.10</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I7C</td>
<td>.98</td>
<td>.02</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I8C</td>
<td>.93</td>
<td>.06</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I9C</td>
<td>.83</td>
<td>.12</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I10C</td>
<td>.98</td>
<td>.02</td>
<td>.00</td>
</tr>
<tr>
<td>Intention to Use</td>
<td>I18</td>
<td>.75</td>
<td>.04</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I30</td>
<td>.77</td>
<td>.04</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I36</td>
<td>.81</td>
<td>.03</td>
<td>.00</td>
</tr>
<tr>
<td>Advantages</td>
<td>I27</td>
<td>.67</td>
<td>.06</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I29</td>
<td>.66</td>
<td>.06</td>
<td>.00</td>
</tr>
<tr>
<td></td>
<td>I32</td>
<td>.81</td>
<td>.03</td>
<td>.00</td>
</tr>
</tbody>
</table>
Inter-item correlations. The inter-item correlations were reported in the matrix of Table 4.6. The inter-item correlations within and across scales provided evidence of convergent and divergence evidence of validity. It also indicates the internal consistency of the scales by displaying the correlations of each item with every other item in the same scale. The internal consistency of a scale was a necessary condition for scale validity.

Moreover, the inter-item correlations within scales also provided some convergent evidence of validity for these scales. The results of the study indicated the items within a scale were highly correlated with each other (higher than .50), whereas the items from different scales were less likely to be correlated (lower than .20), which provided some divergent evidence of validity for these scales.

Furthermore, the average inter-item correlations and average item-total correlations were calculated for the eight scales for the evidence of scale reliability and validity (see Table 4.11). Except for the scale of Ease of Use, the other scales all had the average inter-item correlations higher than .53, and the average inter-total correlations higher than .64. The two indices for the scale of Ease of Use were around .20, which implied poor convergence of items in the scale. The descriptive statistics, including the means and standard deviations, for all the items were reported in Table 4.7.
Table 4.6  Inter-Item Correlations

<table>
<thead>
<tr>
<th>Item</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H</td>
<td>I</td>
<td>J</td>
<td>K</td>
<td>L</td>
<td>M</td>
<td>N</td>
<td>O</td>
<td>P</td>
</tr>
<tr>
<td>1</td>
<td>.15</td>
<td>.10</td>
<td>.08</td>
<td>.06</td>
<td>.04</td>
<td>.02</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>2</td>
<td>.10</td>
<td>.08</td>
<td>.06</td>
<td>.04</td>
<td>.02</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>3</td>
<td>.08</td>
<td>.06</td>
<td>.04</td>
<td>.02</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>4</td>
<td>.06</td>
<td>.04</td>
<td>.02</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>5</td>
<td>.04</td>
<td>.02</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>6</td>
<td>.02</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>7</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>8</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>9</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>10</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>11</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>12</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>13</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>14</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>15</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
<tr>
<td>16</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
<td>.00</td>
</tr>
</tbody>
</table>

Note: *p < .05;
Table 4.11

**Corrected Item-Total Correlations**

<table>
<thead>
<tr>
<th>Scale</th>
<th>Item</th>
<th>Corrected Item-Total Correlations</th>
<th>Average Item-Total Correlations</th>
<th>Average Inter-Item Correlations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with Qualitative Methods</td>
<td>I5A</td>
<td>.43</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I6A</td>
<td>.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I7A</td>
<td>.75</td>
<td>.66</td>
<td>.53</td>
</tr>
<tr>
<td></td>
<td>I8A</td>
<td>.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I9A</td>
<td>.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I10A</td>
<td>.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact with Quantitative Methods</td>
<td>I5B</td>
<td>.31</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I6B</td>
<td>.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I7B</td>
<td>.88</td>
<td>.75</td>
<td>.63</td>
</tr>
<tr>
<td></td>
<td>I8B</td>
<td>.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I9B</td>
<td>.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I10B</td>
<td>.87</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Contact with Mixed Methods</td>
<td>I5C</td>
<td>.72</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I6C</td>
<td>.86</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I7C</td>
<td>.95</td>
<td>.87</td>
<td>.79</td>
</tr>
<tr>
<td></td>
<td>I8C</td>
<td>.88</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I9C</td>
<td>.84</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I10C</td>
<td>.96</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intention to Use</td>
<td>I18</td>
<td>.66</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I30</td>
<td>.65</td>
<td>.67</td>
<td>.59</td>
</tr>
<tr>
<td></td>
<td>I36</td>
<td>.69</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advantage</td>
<td>I27</td>
<td>.67</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I29</td>
<td>.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I32</td>
<td>.71</td>
<td>.67</td>
<td>.54</td>
</tr>
<tr>
<td></td>
<td>I38</td>
<td>.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I44</td>
<td>.68</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ease of Use</td>
<td>I24</td>
<td>.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I28</td>
<td>.05</td>
<td>.18</td>
<td>.19</td>
</tr>
<tr>
<td></td>
<td>I31</td>
<td>.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I48</td>
<td>.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compatibility</td>
<td>I17</td>
<td>.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I33</td>
<td>.68</td>
<td>.64</td>
<td>.57</td>
</tr>
<tr>
<td></td>
<td>I35</td>
<td>.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reasons</td>
<td>I45</td>
<td>.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I46</td>
<td>.79</td>
<td>.77</td>
<td>.71</td>
</tr>
<tr>
<td></td>
<td>I47</td>
<td>.71</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
To sum up, taken all the above evidence together, the scale scores were believed to be reliable and valid to measure what they are supposed to measure, and thus were ready for the following model analysis. Specifically, the confirmatory factor analysis has provided some construct evidence of validity through examining the factor structure and model fit. The standardized factor loadings between the items and their scale were all higher than .33 (see Table 4.5), which indicated that the items measured their construct well. Moreover, the items were highly correlated with each other within each scale and less likely associated with the items of the other scales, which provided some convergent and discriminant evidence of validity (see Table 4.6). Lastly, the internal reliability coefficients of Cronbach’s $\alpha$ for all the above scales were good, higher than .73 (see Table 4.4). The inter-item and corrected item-total correlations between the items of the instrument were all good in general. In the following two sections, a few extra statistics analysis were used to provide the evidence of validity for certain scales in the instrument.

Table 4.7

Means and Standard Deviations for All Items

<table>
<thead>
<tr>
<th>Scale</th>
<th>Item</th>
<th>Mean</th>
<th>Range</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact with</td>
<td>I5A</td>
<td>2.12</td>
<td>[0, 58]</td>
<td>2.90</td>
<td>241</td>
</tr>
<tr>
<td>Qualitative Methods</td>
<td>I6A</td>
<td>1.96</td>
<td>[0, 58]</td>
<td>4.48</td>
<td>238</td>
</tr>
<tr>
<td></td>
<td>I7A</td>
<td>1.74</td>
<td>[0, 58]</td>
<td>4.00</td>
<td>238</td>
</tr>
<tr>
<td></td>
<td>I8A</td>
<td>2.08</td>
<td>[0, 58]</td>
<td>6.06</td>
<td>239</td>
</tr>
<tr>
<td></td>
<td>I9A</td>
<td>11.46</td>
<td>[0, 58]</td>
<td>45.72</td>
<td>238</td>
</tr>
<tr>
<td></td>
<td>I10A</td>
<td>4.15</td>
<td>[0, 58]</td>
<td>10.71</td>
<td>238</td>
</tr>
<tr>
<td>Contact with</td>
<td>I5B</td>
<td>2.51</td>
<td>[0, 58]</td>
<td>4.40</td>
<td>241</td>
</tr>
<tr>
<td>Quantitative Methods</td>
<td>I6B</td>
<td>1.89</td>
<td>[0, 58]</td>
<td>3.53</td>
<td>238</td>
</tr>
<tr>
<td></td>
<td>I7B</td>
<td>1.96</td>
<td>[0, 58]</td>
<td>5.52</td>
<td>238</td>
</tr>
<tr>
<td></td>
<td>I8B</td>
<td>2.34</td>
<td>[0, 58]</td>
<td>6.87</td>
<td>238</td>
</tr>
<tr>
<td></td>
<td>I9B</td>
<td>15.07</td>
<td>[0, 58]</td>
<td>62.81</td>
<td>238</td>
</tr>
<tr>
<td></td>
<td>I10B</td>
<td>5.74</td>
<td>[0, 58]</td>
<td>16.22</td>
<td>238</td>
</tr>
<tr>
<td>Contact with Mixed Methods</td>
<td>I5C</td>
<td>0.87</td>
<td>[0, 58]</td>
<td>1.81</td>
<td>239</td>
</tr>
<tr>
<td>----------------------------</td>
<td>-----</td>
<td>-------</td>
<td>---------</td>
<td>-------</td>
<td>-----</td>
</tr>
<tr>
<td>I6C</td>
<td>1.07</td>
<td>[0, 58]</td>
<td>3.06</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>I7C</td>
<td>1.14</td>
<td>[0, 58]</td>
<td>4.82</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>I8C</td>
<td>1.61</td>
<td>[0, 58]</td>
<td>7.51</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>I9C</td>
<td>4.47</td>
<td>[0, 58]</td>
<td>15.99</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>I10C</td>
<td>3.43</td>
<td>[0, 58]</td>
<td>20.07</td>
<td>239</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intention to Use</th>
<th>I18</th>
<th>5.35</th>
<th>[1, 7]</th>
<th>1.27</th>
<th>240</th>
</tr>
</thead>
<tbody>
<tr>
<td>I30</td>
<td>5.31</td>
<td>[1, 7]</td>
<td>1.17</td>
<td>243</td>
<td></td>
</tr>
<tr>
<td>I36</td>
<td>4.86</td>
<td>[1, 7]</td>
<td>1.30</td>
<td>241</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Advantages</th>
<th>I27</th>
<th>4.75</th>
<th>[1, 7]</th>
<th>1.27</th>
<th>243</th>
</tr>
</thead>
<tbody>
<tr>
<td>I29</td>
<td>4.62</td>
<td>[1, 7]</td>
<td>1.30</td>
<td>243</td>
<td></td>
</tr>
<tr>
<td>I32</td>
<td>4.82</td>
<td>[1, 7]</td>
<td>1.27</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>I38</td>
<td>5.10</td>
<td>[1, 7]</td>
<td>1.21</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>I44</td>
<td>5.14</td>
<td>[1, 7]</td>
<td>1.24</td>
<td>238</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ease of Use</th>
<th>I24</th>
<th>4.51</th>
<th>[1, 7]</th>
<th>3.00</th>
<th>237</th>
</tr>
</thead>
<tbody>
<tr>
<td>I28</td>
<td>5.17</td>
<td>[1, 7]</td>
<td>4.79</td>
<td>243</td>
<td></td>
</tr>
<tr>
<td>I31</td>
<td>3.91</td>
<td>[1, 7]</td>
<td>1.30</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>I48</td>
<td>4.25</td>
<td>[1, 7]</td>
<td>1.40</td>
<td>240</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compatibility</th>
<th>I17</th>
<th>4.91</th>
<th>[1, 7]</th>
<th>1.39</th>
<th>244</th>
</tr>
</thead>
<tbody>
<tr>
<td>I33</td>
<td>4.56</td>
<td>[1, 7]</td>
<td>1.30</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>I35</td>
<td>4.54</td>
<td>[1, 7]</td>
<td>1.32</td>
<td>239</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Reasons</th>
<th>I45</th>
<th>5.61</th>
<th>[1, 7]</th>
<th>1.19</th>
<th>240</th>
</tr>
</thead>
<tbody>
<tr>
<td>I46</td>
<td>5.48</td>
<td>[1, 7]</td>
<td>1.15</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>I47</td>
<td>5.87</td>
<td>[1, 7]</td>
<td>1.17</td>
<td>239</td>
<td></td>
</tr>
</tbody>
</table>

Group Comparison for External Evidence of Validity

Group comparison tests were run for the scales of Contact with Qualitative Methods and Contact with Quantitative Methods. The two groups were quantitative-oriented and qualitative-oriented researchers. The logic of the group comparison was like this: if the scale of Contact with Qualitative Methods measures what it should measure, the significant group difference should be found (the group of qualitative-oriented researchers should have significantly higher mean scores than the group of quantitative-oriented researchers). Accordingly, the group comparison results could provide some external evidence of validity for the two scales.

The first step was to identify the two groups. In the questionnaire, four items
were designed to ask about participants’ self-efficacy in different research methods, including “I am good at analyzing qualitative data,” “I am confident in doing qualitative research,” “I am good at analyzing quantitative data,” and “I am confident in doing quantitative research.” The mean across the first two items served as the outcomes for a new variable about participants’ qualitative expertise, and the mean across the last two items served out the outcomes for another new variable about participants’ quantitative expertise.

The two new variables were then used to categorize all participants into four groups: (1) people with a high score in qualitative research and a low score in quantitative research (n=70), (2) people with a low score in qualitative research and high score in quantitative research (n=62), (3) people with low scores in both qualitative and quantitative research (n=62), (4) people with high scores in both qualitative and quantitative research (n=50). Then, only the participants in the first two groups were used in the following group comparison test (n=132). Accordingly, people in Group 1 were defined as qualitative-oriented researchers because they were good at qualitative research and poor at quantitative research; whereas people in Group 2 were defined as quantitative-oriented researchers.

Next, two hypotheses were tested. The first hypothesis is that people in Group 1 should have significantly higher mean scores of the scale of Contact with Qualitative Methods than people in Group 2 if the scale is reliable and valid in testing qualitative research experience. The second hypothesis is that people in Group 2 should have significantly higher mean scores of the scale of Contact with Quantitative Methods than people in Group 1 if the scale is reliable and valid in testing quantitative research.
experience.

Then, two t-test analyses were conducted separately to test the above two hypotheses. The first t-test result indicated that qualitative-oriented researchers have significantly higher mean scores in Contact with Qualitative Methods than quantitative-oriented researchers \((t=2.00, p<.05)\). Therefore, the result provided some external evidence of validity for the scale of Contact with Qualitative Methods. Moreover, the second t-test indicated that quantitative-oriented researchers have significantly higher mean scores in Contact with Quantitative Methods than qualitative-oriented researchers \((t=2.84, p<.01)\). Such result provided some external evidence of validity for the scale of Contact with Quantitative Methods.

Lastly, an extra t-test was conducted to test the group difference regarding researchers’ contact with mixed methods. No difference was found, which indicated that qualitative-oriented researchers and quantitative-oriented researchers were not different from each other in using mixed methods research.

**Correlational Analysis for Concurrent Evidence of Validity**

Correlational analysis was conducted for the scale of Intention to Use, using the number of individual’s current experience with mixed methods projects as the criterion. The logic of this test was like this: if the scale of Intention to Use is valid to measure people’s decision of adopting mixed methods, the scale scores should be correlated with their current use of this method. Thus, the results could provide some concurrent evidence of validity for the scale.

In the study, two items ask about participants’ current use of mixed methods in terms of conduction of mixed methods and presentation of mixed methods: “How many
studies did you participate in using this methodology?” and “How many times did you present this type of research (including publishing papers, presenting at conferences, and speaking at lectures)?” The two items were used to correlate the scale scores of Intention to Use for the concurrent evidence of validity for this scale (n=247).

The hypothesis of the test was: the stronger people’s intentions of using mixed methods are, the more mixed methods research they should have conducted and presented in the present. The results of the regression analysis indicated the significant and positive relationship between individual’s intention to use mixed methods and their conduction of mixed methods research (std. $\beta = .50, p < .01$), as well as between individual’s intention to use mixed methods and their presentation of this method (std. $\beta = .35, p < .01$). That said, the significant results provided some concurrent evidence of validity for the scale of Intention to Use Mixed Methods.

Moreover, the same correlational analysis was also conducted for the four perception scales: Compatibility, Relative Advantage, Reasons, and Ease of Use. Significant and positive relationship was found between individual’s perceived compatibility and conduction of mixed methods (std. $\beta = .16, p < .001$), between compatibility and presentation of mixed methods (std. $\beta = .19, p < .001$), and between individual’s perceived advantage of using mixed methods and current conduction of mixed methods research (std. $\beta = .15, p < .01$). In short, the correlational analysis also provided some concurrent evidence of validity for the two scales of Compatibility and Relative Advantage.

Quantitative Results

After the above analysis of the scale scores’ reliability and validity, the next step
of the study was to test the hypothesized model using the scale scores (see Figure 1.1) and to identify the influential factors of adoption.

**Descriptive Statistics of the Variables**

In the study, the hypothesized path analysis model was used to examine the influential factors of Chinese scholars’ intentions to use mixed methods and their contact with mixed methods. It consisted of eight variables. The descriptive statistics of all the variables were reported in Table 4.8.

Table 4.8

*Means, SDs, Ns and Bivariate Correlations of Variables in the Path Analysis Model*

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Contact with Qual</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Contact with Quan</td>
<td>.55*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Contact with MM</td>
<td>.65*</td>
<td>.72*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Intention</td>
<td>.10</td>
<td>.02</td>
<td>.19*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Advantages</td>
<td>.11</td>
<td>-.00</td>
<td>.15*</td>
<td>.74*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Ease of Use</td>
<td>.00</td>
<td>.02</td>
<td>.07</td>
<td>.36*</td>
<td>.45*</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Compatibility</td>
<td>.11</td>
<td>.08</td>
<td>.21*</td>
<td>.74*</td>
<td>.74*</td>
<td>.39*</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>8. Reasons</td>
<td>-.01</td>
<td>-.09</td>
<td>.08</td>
<td>.56*</td>
<td>.60*</td>
<td>.33*</td>
<td>.51*</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*Means* | 3.24  | 3.58  | 1.83  | 5.18  | 4.88  | 4.47  | 4.68  | 5.65  |

*SDs*   | 5.46  | 5.41  | 4.68  | 1.07  | 1.00  | 1.64  | 1.14  | 1.05  |

*Maximum* | 58    | 58    | 58    | 7     | 7     | 7     | 7     | 7     |

*Ns*    | 241   | 241   | 239   | 243   | 244   | 245   | 244   | 241   |

*Note: * p<. 05

The total sample size was 247, with 185 females (75%) and 62 males (25%). The demographic information of all the participants was summarized in Table 4.10. In summary, the average age of the participants was 27.35 with a standard deviation of 7.32. The youngest participant was 22; and the oldest was 66. Approximately 72% (n=179) of
the participants were graduate students (about half of them being master students and the second half being doctoral students), and 28% (n=68) of the participants were university faculty members (50% of them being assistant professors, 26% being professors and associate professors, and 24% being research faculty). Participants came from a variety of disciplines, including public health (n=51, 20%), nursing (n=48, 19%), psychology (n=47, 19%), management (n=41, 17%), education (n=36, 15%), and arts and sciences (n=24, 10%).

Table 4.10

Table of Participants’ Demographic Information

<table>
<thead>
<tr>
<th>Sample Size</th>
<th>Gender</th>
<th>Status</th>
<th>Disciplines</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=247</td>
<td>Female 75%</td>
<td>Doctoral students 36%</td>
<td>Public health 20%</td>
</tr>
<tr>
<td></td>
<td>Male 25%</td>
<td>Master students 36%</td>
<td>Nursing 19%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Assistant professor 14%</td>
<td>Psychology 19%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Professors 7%</td>
<td>Management 14%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Research faculty 7%</td>
<td>Education 15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Other Arts/Sciences 10%</td>
</tr>
</tbody>
</table>

The bivariate correlations of all the eight variables in the model are reported in Table 4.8. As the results indicated, participants’ intentions to use mixed methods were significantly associated with their contact with this methodology (r=.19, p<.05). In addition, participants’ perceived advantages, compatibility, reasons, and ease of using mixed methods were all correlated with their intentions to use mixed methods (all rs>.36*). That said, Chinese participants’ perceptions of mixed methods as well as their contact with this methodology are significantly related to their intentions of adoption. Furthermore, the mean of Intention to Use was 5.18 on a 7-point scale, with higher scores
indicating a higher level of intention to use mixed methods. That said, Chinese scholars are very likely to adopt mixed methods in the future.

Moreover, participants’ current contact with mixed methods was related to their contact with both qualitative and quantitative methods ($r = .65 \ p < .05$; and $r = .72, \ p < .05$, respectively), and also associated with participants’ perceptions of mixed methods’ advantage and compatibility ($r = .15 \ p < .05$; and $r = .21, \ p < .05$, respectively). However, participants’ contact with mixed methods was quite diverse, with the mean of 1.83 and the standard deviation of 4.68, ranging from 0 to 58. Approximately 30.96% of the participants (n=74) had no contact with mixed methods. That said, on average, Chinese scholars have very few experiences with mixed methods.

Lastly, participants’ perceptions of mixed methods, including the advantages, compatibility, reasons, and ease of using mixed methods, were all high, with all the means higher than 4.5 on a 7-point scale. In other words, Chinese scholars are generally positive about the attributes of mixed methods.

**Model Testing Results**

To investigate the significant factors of participants’ intentions to use mixed methods, the hypothesized model of the study (Figure 1.1) was examined. The model fit the data well, $\chi^2 (2) = 3.04, \ p = .22$; $\text{CFI} = 1.00$; $\text{RMSEA} = .05$, 90% CI = [.00, .10], $\text{SRMR} = .01$. To improve the statistical power in testing the significant predictions, the model was modified through fixing the non-significant paths at 0. The finalized model (Appendix E; the scaling correction factor for MLR: 1.34) was not significantly worse than the hypothesized one through the MLR chi-square difference testing ($\Delta \chi^2 = 15.43$, $\Delta \text{df} = 11, \ p = .22$). The final model fit the data well, $\chi^2 (13) = 17.39, \ p = .18$; $\text{CFI} = 1.00$;
RMSEA = .04, 90% CI = [.00, .08]; SRMR = .06.

Then, the final model was estimated to identify the influential factors of participants’ intentions to use mixed methods and contact with mixed methods. The model results with the standardized path coefficients are reported in the Figure 4.2.

As for the endogenous variable in the model, Intention to Use, the results indicated that participants’ intentions to use mixed methods are predicted by their perceived advantages of using mixed methods (std. $\beta = .34$, $p<.001$), the compatibility of mixed methods to their current work situations (std. $\beta = .42$, $p<.001$), and the perceived reasons to use mixed methods (std. $\beta = .15$, $p<.01$), after controlling for their current research experience. Among the three predictors, mixed methods’ compatibility is more influential to participants’ decisions of adoption, compared with the perceived advantages and reasons of using mixed methods (contrast = .08 and .27, $ps<.01$). The model significantly explained 64.5% of the variances of participants’ intentions to use mixed methods.
As for another endogenous variable, Contact with Mixed Methods, the results indicated that participants’ contact with mixed methods is significantly predicted by their contact with qualitative (std. $\beta = .36, p < .001$) and quantitative methods (std. $\beta = .51, p < .001$), as well as the perceived ease of using mixed methods (std. $\beta = .06, p < .05$), after controlling for the other predictors in the model. That said, those who have had adequate contact with qualitative and quantitative research and who have perceived mixed methods as simple to use are more likely to have contacted with mixed methods, including reading about and or conducting mixed methods research. Moreover, the effects of participants’ contact with qualitative and with quantitative methods on their contact with mixed...
methods had no difference (contrast = .15, p>.05). The model significantly explained 60.2% of the variances of participants’ contact with mixed methods.

As for another endogenous variable, Relative Advantage, participants’ perceived advantages of using mixed methods are significantly predicated by the perceived ease of using mixed methods (std. $\beta = .15, p<.01$), the perceived reasons to use mixed methods (std. $\beta = .27, p<.001$), and the perceived compatibility of using mixed methods (std. $\beta = .54, p<.001$). The model significantly explained 63% of the variances of participants’ perceived advantages of using mixed methods.

Moreover, participants’ perceived advantages of using mixed methods partially mediate the effect of participants’ perceived compatibility on their intention to use mixed methods (std. $\beta^* \beta = .19, p<.001$). The 95% confidence interval of such mediation is [.10, .26] using the Monte Carlo resampling method (replication = 20,000). In addition, participants’ perceived advantages of using mixed methods also partially mediate the effect of scholars’ perceived reasons to use mixed methods on their intention to use (std. $\beta^* \beta = .09, p<.01$). The 95% confidence interval of such mediation is [.05, .16] using the Monte Carlo resampling method (replication = 20,000). Additionally, participants’ perceived advantages of using mixed methods fully mediate the effect of participants’ perceived ease of use on their intention to use (std. $\beta^* \beta = .05, p<.05$). The 95% confidence interval of such mediation is [.01, .07] using the Monte Carlo resampling method (replication = 20,000). In short, the Relative Advantage is an important and unique factor of adoption. Its mediation effects exist between people’s perceptions of using mixed methods and the decision of adopting this method. These mediation effects cannot be ignored.
Lastly, in terms of the relationships between variables, participants’ perceived ease of using mixed methods, perceived compatibility of using mixed methods, and perceived reasons to use mixed methods were highly correlated with each other (all std. βs > .34, p< .001). Participants’ contact with qualitative research was significantly related to their contact with quantitative research (all std. βs > .55, p< .001).

Furthermore, after controlling for all the predictors, participants’ intentions of using mixed methods were not associated with their contact with this method.

In short, the more contact participants have with qualitative and quantitative research, the more contact participants would have with mixed methods research. In addition, the more compatible participants think mixed methods to be with their current work and research, the more likely participants would use this methodology. Moreover, people’s perceived advantages of using mixed methods have the unique and important effects on the adoption of mixed methods. Lastly, participants’ perceived reasons to use mixed methods and ease of using mixed methods are also important to participants’ decisions of adopting mixed methods.

**Summary**

The qualitative findings of the study revealed that China is adopting mixed methods but at a slow rate due to researchers’ insufficient expertise and a variety of practical issues. Based on the qualitative findings and the relevant literature reviews, the study developed an instrument to measure Chinese scholars’ perceptions and use of mixed methods. The quantitative results confirmed the qualitative findings regarding Chinese scholars’ enthusiasm but insufficient expertise of using mixed methods.

Lastly, the influential factors on the adoption of mixed methods in China were
identified in the final path analysis model of the study. Specifically, Chinese scholars’
tention to use mixed methods was predicted by their perceived compatibility, reasons,
and advantages of using mixed methods; whereas their current use of this method was
predicted their qualitative and quantitative research experience as well as the perceived
ease of using mixed methods.
CHAPTER V

DISCUSSION

Introduction

This chapter consists of two sections: the methodological impact and the content impact of the study. The methodological impact section discusses how the initial qualitative case study connects with the follow-up survey to deeply investigate the adoption of mixed methods in China. The mixing occurs sequentially given one phase building to the other. The mixing also occurs in interpretation through comparing the results of the two phases. Merging the qualitative and quantitative results of the study is reasonable because the samples in the qualitative case study and the quantitative survey are from the same population. Besides the mixing, the methodological impact section also addresses the methodological research questions of the study, including the generalization of the qualitative findings using an exploratory instrument design, instrument construction, and model development.

The second section of this chapter is about the content impact of the study. It discusses the research questions about Chinese scholars’ perceptions and use of mixed methods. Moreover, the context of the adoption of mixed methods is also explored, including the disciplines that have adopted mixed methods in China and the logistical and practical issues in adoption. In addition to the context of adoption, the influential factors of adoption are examined based on the theoretical framework and literature. Lastly, the section discusses the current expansion of mixed methods in China and the ways of enhancing its expansion.
Methodological Impact of the Study

In the exploratory instrument study, qualitative and quantitative phases were combined through both sequential connection and convergent integration. A variety of mixing strategies were employed (see Table 5.3). The detailed information for each of the mixing strategies is discussed in the following text.

Table 5.3.

Summary Table of Mixing Strategies

<table>
<thead>
<tr>
<th>Mixing Strategies</th>
<th>Point of integration in the study</th>
</tr>
</thead>
</table>
| **Mixing through connecting qualitative and quantitative phases** | • Quantitative research questions/hypotheses refinement according to qualitative findings  
• Survey participant selection according to qualitative findings  
• Scale development and validation analysis according to qualitative findings  
• Joint display of scale development and validation analysis (Table 5.1) |
| **Mixing through merging qualitative and quantitative results** | • Side by side comparison and discussion about Chinese perceptions  
• Side by side comparison and discussion about Chinese intentions  
• Corroboration of qualitative findings with quantitative results  
• Joint display of Chinese perceptions and intentions of using mixed methods (Table 5.2) |

Mixing through Connecting Qualitative and Quantitative Phases

In the study, the initial qualitative case study built to the follow-up quantitative survey through the following three aspects. First, the quantitative research questions and hypotheses were refined based on the qualitative findings and the results of instrument validation analysis. Second, the sample of the survey was defined according to the qualitative results. Third, the questionnaire in the survey was developed on the basis of qualitative findings and literature reviews. The above three types of mixing techniques
are typically related to a sequential exploratory mixed methods research design. As Creswell and Plano Clark (2011) discussed about the exploratory design procedures, “In the next step which represents the point of interface in mixing, researchers using this design build on the results of the qualitative phase by developing an instrument, identifying variables, or stating propositions for testing based on an emergent theory or framework. These developments connect the initial qualitative phase to the subsequent quantitative strand of the study.” (p.87)

Moreover, as many researchers have suggested, mixing or integration should be considered at all stages of the research, from the design to the implementation (Boeije, Slagt, & Wesel, 2013; Woolley, 2009). The current study presents a good example of rigorously connecting qualitative and quantitative components at both the design level and the method level as follows.

**Research questions and hypotheses refinement.** In the study, three out of five quantitative research questions were generated according to the initial qualitative findings. Specifically, the first two quantitative questions addressed the same topics as the first two qualitative research questions of the study on purpose in order to generalize the initial qualitative findings. The two quantitative research questions asked about to what extent participants understand and use mixed methods, which are consistent with the first two qualitative research questions in the initial qualitative phase about Chinese scholars’ perceptions and use of mixed methods. Moreover, the third quantitative research question asked about the influential factors of adoption because the initial qualitative findings implied several factors impacting Chinese scholars’ use of mixed methods.

Moreover, the quantitative hypotheses and the model of the study were refined
based on the scale development and testing results. For instance, after the pilot study, two scales with poor reliability and validity were removed from the hypothesized model. Accordingly, the original hypotheses about the two factors were deleted in the quantitative phase. Similarly, after confirmatory factor analysis, three additional scales were removed due to their poor psychometric properties. Accordingly, three original hypotheses about these factors were deleted. In short, the quantitative research hypotheses in the third phase were changed according to the results of scale development and validation analysis in the second phase of the study.

Many researchers have advocated that a good mixed methods study should integrate the qualitative and quantitative components at the state of research design, such as research questions (Bryman, 2006; Creswell & Plano Clark, 2011; Woolley, 2009). However, in the literature of sequential mixed methods research, very few articles explicated how the initial phase informed and refined the research questions of the later phases. Addressing such gap, this study illustrates how the quantitative research questions and hypotheses were specified on the basis of the former phases.

**Participant selection.** In the study, the initial qualitative findings helped to select the sample of the survey. The sample was chosen from Chinese scholars at top 300 Chinese comprehensive universities of 2012 because the qualitative findings suggest that the majority of Chinese scholars who use or will potentially use mixed methods are from higher education, including professors and senior graduate students who have learned about either qualitative and/or quantitative research. In short, the initial qualitative research results lead to the specification of the sample for the follow-up survey phase. This mixing strategy is very common in the sequential mixed methods research designs.
As Collins et al. (2006) said, mixing two phases could ensure each participant selected is appropriate for inclusion. This study presents a good example of participant enrichment through connecting the quantitative phase with the initial qualitative phase.

**Scale development.** The most noticeable mixing in the study is the instrument development based on the initial qualitative results. Such mixing procedure addresses the second mixed methods research question of the study: how good the new instrument is developed using the exploratory sequential design? The joint display of scale development and validation analysis is summarized in Table 5.1. The detailed information is discussed as follows.

According to the results of the study, four new scales were developed in the instrument development phase, and two of them were found with good psychometric properties in the instrument validation analysis process. The two scales were Reasons to Use Mixed Methods and Experience with Mixed Methods (which included three subscales: Contact with Qualitative Approaches, Contact with Quantitative Approaches, and Contact with Mixed Methods). The method of developing the above scales in the study is similar to many empirical studies that have employed exploratory instrument design in scale construction (Crede & Borrego, 2013; Durham, Tan, & White, 2011; Hitchcock, et al, 2006). However, although the published articles claimed that the authors used the qualitative codes and findings to generate the items and scales, they have seldom reported the detailed steps and information. In contrast, this study specifically demonstrates how the items were generated and how the scales were constructed as follows (also see Table 5.1).
Table 5.1

*Joint Display of Scale Development and Validation Analysis*

<table>
<thead>
<tr>
<th>Instrument Development</th>
<th>Analysis for Instrument Validation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Qualitative Findings</strong></td>
<td><strong>Evidence for Content Validation</strong></td>
</tr>
<tr>
<td><strong>Qualitative Themes</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Qualitative Codes/Quotes</strong></td>
<td></td>
</tr>
<tr>
<td>The needs of using mixed methods</td>
<td></td>
</tr>
<tr>
<td>- Completeness in methods</td>
<td>- Literature review</td>
</tr>
<tr>
<td>- Comprehensive understanding</td>
<td>- Qualitative findings</td>
</tr>
<tr>
<td>- Solution to complex problems</td>
<td>- Panel review and feedback</td>
</tr>
<tr>
<td>Reasons to Use Mixed Methods</td>
<td>- Two-stage sorting and review</td>
</tr>
<tr>
<td>Experience with Mixed Methods</td>
<td></td>
</tr>
<tr>
<td>- Qualitative approaches</td>
<td>- Confirmatory factor analysis</td>
</tr>
<tr>
<td>- Quantitative approaches</td>
<td>- Standardized factor loadings</td>
</tr>
<tr>
<td>- Mixed methods</td>
<td></td>
</tr>
<tr>
<td>Quantitative Questionnaire</td>
<td></td>
</tr>
<tr>
<td>Quantitative Sub/Scales from Themes</td>
<td></td>
</tr>
<tr>
<td>Quantitative Items from Codes/Quotes</td>
<td></td>
</tr>
<tr>
<td>The adopted designs of mixed methods research</td>
<td></td>
</tr>
<tr>
<td>- Qualitative approaches</td>
<td>- How many courses did you take to learn about this methodology (qual, quan, mm)?</td>
</tr>
<tr>
<td>- Quantitative approaches</td>
<td></td>
</tr>
<tr>
<td>- Contact with mixed methods</td>
<td></td>
</tr>
</tbody>
</table>

- Internal reliability
- Item-scale correlations
- Confirmatory factor analysis
- Standardized factor loadings
- Literature review
- Qualitative findings
- Panel review and feedback
- Two-stage sorting and review
- Focus group discussion of translation
- Pilot study and item analysis
The ways of improving the use of mixed methods

- Course learning
- Workshop training
- Research conduction
- Results demonstration
- Literature reading
- Cooperation and discussion

- How many training occasions did you attend to learn about this methodology?
- How many studies did you participate in using this methodology?
- How many times did you present this type of research?
- How many articles did you read about this methodology?
- How many times did you talk with others about using this methodology?
**Generation of items, subscales, and scales.** The items in the new scales were generated from the codes and quotes in the qualitative data. For instance, the scale of Reasons to Use was generated based on the first qualitative theme (Needs of Using Mixed Methods). The three items in the scale were constructed according to the qualitative codes, including “completeness in methods,” “comprehensive understanding,” and “solution to complex problems.” (see Table 5.1) In other words, the codes were converted into the items; and the theme became the scale.

For another instance, the scale of Experience with Mixed Methods, as well as its three subscales, were generated from the second and the fourth themes in the qualitative findings (“Designs of Mixed Methods Research” and “Ways of Improving the Use”). According to the theme about mixed methods designs, qualitative and/or quantitative expertise was found critical to the use of mixed methods research. Hence, the scale was designed into three subscales: Contact with Qualitative Approaches, Contact with Quantitative Approaches, and Contact with Mixed Methods. Moreover, the items in the scale/subscales were generated on the basis of the codes from the theme about the ways of improving the use of mixed methods. The generated codes and subcodes included the course learning (and/or workshops), practical work (conduction of research projects and demonstration of research results), literature reading, and discussion. Accordingly, they were converted into quantitative items to measure participants’ knowledge and skill in using different types of research methods. In short, the initial qualitative themes, codes, and sub-codes provided the detailed information for the scale and item generation. Such conversion process is supported by Creswell and Plano Clark (2011) as in the following discussion.
“The mixed methods researcher can use the central phenomenon as the quantitative construct to be assessed by the instrument, the broad themes as the scales to be measured, the individual codes within each themes as the variables, and the specific quotes from individuals as specific items or questions on the instrument.” (p.188)

In the study, as Table 5.1 showed, the themes and the major codes are converted into the scales and subscales; and the individual codes and the quotes are made into the items. Lastly, the scales and subscales are used as the variables in the final model. In short, the scale development steps in the study are systematic and logic. However, these steps are not enough to construct good scales without the following validation analysis.

**Validation analysis of scales.** The validation analysis process in the study has not only employed the statistics approaches, such as item analysis and factor analysis, but it has also combined with qualitative approaches, including panel reviews and sorting comments. A series of panel reviews and literature reviews provide the content evidence of validity. The sorting, focus group discussion, and data analysis in a pilot study provide the construct evidence of validity. In short, both qualitative and quantitative techniques are used for the evidence of validity (see Table 5.1). Table 5.1 is a joint display, which is “a figure or table in which the researcher arrays both quantitative and qualitative data so that the two sources of data can be directly compared.” (Creswell and Plano Clark, 2011, p.226)

The above strategies have been commonly reported in the previous literature. For instance, the approach of panel review is used by Burton and Mazerolle (2011), Dahodwala, et al. (2012), Smolleck, Zembal-Saul, and Yoder (2006), and Onwuegbuzie,
et al. (2010) to verify the content of the new scales in their studies; whereas sorting is used by Agarwa (2011), Agarwal, Xu, and Poo (2011) and Moore and Benbasat (1991, 2001) when they analyze the construct of the new scales.

In short, combining multiple approaches, the current study performs a rigorous process to analyze the content and construct of the scales. Specifically, the procedures for collecting the content evidence of validity consist of literature reviews, qualitative data analysis, and panel reviews. The process for obtaining the construct evidence of validity of scales consists of sorting, focus group discussion, pilot study, reliability testing, item analysis, and confirmatory factor analysis. Taken together, the study presents a comprehensive and systematic way in developing and testing new scales. No measure or model has existed in the field of mixed methods for investigating individuals’ perceptions and intentions of adoption. The current study serves as an empirical example to the literature of using exploratory instrument design for scale construction. It also develops a testable instrument and model to measure the use of mixed methods, which can be used in the future to investigate mixed methods’ adoption in different countries.

**Mixing through Merging Qualitative and Quantitative Results**

In addition to mixing through connecting the qualitative and quantitative phases, the study also merges the two types of results in interpretation to answer the research questions. Specifically, two research questions about Chinese scholars’ perceptions and intentions of using mixed methods are investigated in both qualitative and quantitative phases. The qualitative results indicate that the diffusion of mixed methods in China is at an early stage. Although Chinese scholars are aware of the needs of using mixed methods, only a few of them have adopted this methodology. The quantitative survey
results confirm the above qualitative findings by showing the high means of Chinese scholars’ perceptions of using mixed methods and low means of their use of mixed methods. The qualitative and quantitative results are converged regarding this finding, as displayed in the joint matrix of Table 5.2. More detailed discussion is reported in the second section of the chapter: content impact of the study.

Merging qualitative and quantitative results is not typical in the exploratory instrument design because the major intent of this design is to develop an instrument, and the qualitative and quantitative phases usually have different samples for merging the results. However, in this study, merging is necessary and appropriate because (1) the samples in the qualitative and quantitative phases are from the same population so the results will be generalized to the single population, and (2) the study not only aims to develop scales but is also interested in what findings in the initial qualitative phase can be confirmed and generalized to the population by using survey method in the following quantitative phase.

Therefore, I compared the initial qualitative findings and the quantitative results side by side to examine what findings are consistent with each other in qualitative and quantitative phases and what are not (as in Table 5.2 and Table 5.6). Side-by-side comparison is a common strategy for merged data analysis, which “involves presenting the quantitative results and the qualitative findings together in a discussion or in a summary table so that they can be easily compared.” (Creswell and Plano Clark, 2011, p.223)

To sum up, the current study illustrates how qualitative and quantitative phases are mixed through both connection and merge. The first qualitative phase builds to the
second instrument development phase, and informs the third quantitative phase through developing scales, refining the quantitative research questions and hypotheses, and specifying the sample for the quantitative research phase. In addition to the sequential connection at the design level, the qualitative and quantitative results are also merged in discussion and result interpretation when the research questions are compared side by side and analyzed in a joint display (See Table 5.2). Very few literature of mixed methods research demonstrates integration in such rigorous and complete procedures as in the current study. Accordingly, the study makes the original contribution to the discussion of integration in mixed methods research. The reader may learn some specific strategies of mixing from the study (summarized in Table 5.3).
### Joint Display: Confirming Qualitative Findings in Quantitative Survey

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Qualitative Findings (n=[3, 36])</th>
<th>Quantitative Findings (n=[239, 245])</th>
<th>Comparisons</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do Chinese scholars perceive mixed methods?</td>
<td>• Positive perceptions on the needs of using mixed methods. Mixed methods was generally desired for the comprehensive understanding of research phenomena (from theme 1)</td>
<td></td>
<td>Consistent; The qualitative results were confirmed in quantitative phase.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reasons to use mixed methods</td>
<td>Intention to use mixed methods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$M=5.65/7$ ($SD=1.05$) High</td>
<td>$\beta=.15$, $p&lt;.01$</td>
</tr>
<tr>
<td></td>
<td>• Positive perceptions on the compatibility of mixed methods. E.g. “I am a person who likes thoroughness. So I prefer to use both methods.” (Quote from an interviewee)</td>
<td>Compatibility of mixed methods</td>
<td>Intention to use mixed methods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$M=4.68/7$ ($SD=1.14$) Medium to High</td>
<td>$\beta=.42$, $p&lt;.001$</td>
</tr>
<tr>
<td></td>
<td>• Mixed methods was easy for someone. E.g. “I have used mixed methods for more than 5 years since I used it for my dissertation. It is not hard to me.” (Quote from an interviewee from theme 2)</td>
<td>Ease of use</td>
<td>Contact with mixed methods</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$M=4.47/7$ ($SD=1.64$) Medium and varied</td>
<td>$\beta=.06$, $p&lt;.05$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mixed methods was perceived useful. “*Qualitative approach could provide thick description about the quantitative numbers.*” (Quote from a commentary paper from theme1)

<table>
<thead>
<tr>
<th>Advantage of mixed methods</th>
<th>Intention to use mixed methods</th>
<th>Predicting</th>
<th>Outcome: predicted by reasons, compatibility, and advantage of using mixed methods.</th>
<th>Consistent; The qualitative results were confirmed in quantitative phase.</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Mixed methods have been highly recommended to researchers across disciplines</em></td>
<td>Intention to use mixed methods</td>
<td>$M=4.88/7$ ($SD=1.00$) Medium to High</td>
<td><em>Std. $\beta = .34, p&lt;.001$</em></td>
<td><em>Consistent; The qualitative results were confirmed in quantitative phase.</em></td>
</tr>
<tr>
<td><em>Insufficient qualitative skills, such as coding and validation.</em> (theme2)</td>
<td>Qualitative contact</td>
<td>$M=3.24/58$ ($SD=5.46$) low</td>
<td><em>Std. $\beta = .36, p&lt;.001$</em></td>
<td><em>Consistent; The qualitative results were confirmed in quantitative phase.</em></td>
</tr>
<tr>
<td><em>Insufficient quantitative techniques, such as advanced statistics.</em> (theme 2)</td>
<td>Quantitative contact</td>
<td>$M=3.58/58$ ($SD=5.41$) low</td>
<td><em>Std. $\beta = .51, p&lt;.001$</em></td>
<td><em>Consistent; The qualitative results were confirmed in quantitative phase.</em></td>
</tr>
<tr>
<td><em>Chinese scholars preferred to use the basic mixed methods designs to an advanced design (theme 2)</em></td>
<td>Contact with mixed methods</td>
<td>$M=1.83/58$ ($SD=4.68$) low</td>
<td><em>Outcome: predicted by contact with qualitative and quantitative research, and ease of using mixed methods.</em></td>
<td><em>Consistent; The qualitative results were confirmed in quantitative phase.</em></td>
</tr>
</tbody>
</table>
Generalization of the Initial Findings

Besides the mixing strategies demonstrated in the study, another methodological contribution of the study is how the initial qualitative results are generalized through the follow-up quantitative phase in the exploratory sequential design. The discussion of such generalization addresses the first mixed methods research question of the study: how have the initial qualitative findings regarding Chinese scholars’ perceptions and use of mixed methods been confirmed and generalized to a larger sample through the follow-up quantitative survey phase?

The exploratory sequential design is a two- or three-phase sequential design, in which the researcher starts by qualitatively exploring a topic before building to a quantitative phase in order to generalize qualitative findings to a larger sample (Creswell & Plano Clark, 2011). In the current study, the initial case study discusses the detailed information of why China is defined at the beginning stage of adoption and what can be done to improve the status. The qualitative findings help with the understanding of mixed methods’ expansion in East China. However, such results from East China are hard to generalize to other parts of China without confirming them in a large sample. Therefore, the follow-up quantitative survey is conducted to examine the adoption of mixed methods in a large sample all over China. The survey results confirm the initial qualitative findings by indicating that Chinese scholars’ intentions of adoption are high; but the actual use is low. Merging the two results, the study discusses the expansion of mixed methods in China and the ways to enhance its use. In all, the study is a good example of using an exploratory sequential design to explore an under-studied phenomenon (see Table 5.6).
However, using the exploratory design does not guarantee all the detailed qualitative results to be generalized in the quantitative phase. For instance, in the study, the two newly developed scales of Self-efficacy and Barriers of using mixed methods were not confirmed in the survey data. For another instance, according to the qualitative findings, Chinese scholars’ perceived needs of using mixed methods are important to their use of mixed methods; but the scale scores (Reasons to Use) were not significantly related to individuals’ contact with mixed methods. Nevertheless, although not all qualitative findings are confirmed in quantitative phase, the ones that are consistent with the survey results are considered to be trustworthy and generalized.

In short, the interpretation of Chinese adoption of mixed methods in the study is not only credible but also comprehensive due to the comparison of qualitative and quantitative results. Moreover, the study confirms the initial qualitative findings from a small sample in a large sample through sequentially connecting qualitative and quantitative phases. Using the exploratory design to generalize or confirm the initial qualitative results is consistent in mixed methods research literature (Crede & Borrego, 2013; Durham, Tan, & White, 2011; Hitchcock, et al, 2006; Nastasi, et al., 2007). Particularly, Creswell and Plano Clark (2011) defined the purpose of the exploratory design as “to generalize qualitative findings based on a few individuals from the first phase to a larger sample gathered during the second phase.” (p. 86) The generalization is also called as “expansion” by Greene et al. (1989) that “seeks to extend the breadth and range of enquiry by using different methods for different inquiry components.” (p.259)

In all, the study contributes to the literature of the exploratory design by successfully demonstrating how the qualitative exploration of a research phenomenon can
be augmented and enhanced using a different type of method in a single study.

Meanwhile, it also advocates the advantages of using mixed methods rather than using qualitative approaches alone in exploring an unknown topic, because mixed methods can confirm the information from a few individuals in a large sample of that population.

Table 5.6

Integration in Exploratory Sequential Design

<table>
<thead>
<tr>
<th>Intent of Exploratory Sequential Design</th>
<th>Integration of Data</th>
<th>Example of the Comparison Being Made</th>
<th>Table Illustrating the Comparison</th>
</tr>
</thead>
</table>
| To generalize qualitative findings     | Joint display showing how qualitative and quantitative data merge (see Table 5.2) | • Qualitative findings showed (1) Chinese scholars recognized the reasons to use mixed methods, and so that (2) Chinese scholars desired to use this method.  
• Quantitative results indicated (1) the mean across items of the scale “Reasons to Use Mixed Methods” was as high as 5.65 out of 7 point, and (2) the variable of “Reasons” significantly predict Chinese scholars’ intention to use mixed methods (Std. $\beta = .15$, p<.01).  
• Thus, the qualitative findings were confirmed and generalized from a small sample to a larger sample as confirmed in the quantitative investigation. | Table 5.2 |
To develop an instrument grounded in the views of participants, joint display to show how the qualitative themes built into the design of the instrument (see Table 5.1)

| Joint display to show how the qualitative themes built into the design of the instrument (see Table 5.1) | • The qualitative codes/quotes of the theme “Needs of Using Mixed Methods” become the quantitative items of the construct of “Reasons to Use Mixed Methods”, such as “Completeness in methods” (the qualitative code) → “The weakness of one research method can be offset by the strengths of the other research method.” (the quantitative item) | Table 5.1 |

**Instrument Developed in the Study**

Besides the above methodological contributions regarding mixing strategies and generalization, this study also contributes to the methodological concerns of using an exploratory design to develop an instrument and a model of interest (see Table 5.6). The following discussion answers the fourth quantitative research question of the study regarding the newly developed instrument’s psychometric properties.

The instrument of Adoption of Mixed Methods is developed in the study through adapting four existing innovation diffusion scales to the field of mixed methods research and constructing four new scales/subscales based on the initial qualitative case study (Table 5.1). At the initial validation analysis stage, both the logically based validity (e.g. content-related validity) and empirically based validity (e.g. criterion-related validity, and construct-related validity) (Onwuegbuzie, Dainel, & Collins; 2009) are analyzed. In the study, the panel reviews, literature reviews, and the initial qualitative data analyses provide the content evidence of validity. A focus group interview and a pilot study are further conducted to examine the adapted Chinese version of the instrument.

These strategies are compatible with the relevant literature. According to the

In addition to the content evidence of validity, the study also provides the construct evidence of validity through a series of sorting and panel reviews. In each sorting process, judges’ inter-rater reliability, Cohen’s Kappa reliability, and hits ratios are examined (as the validity indices) to ensure that judges’ evaluations of the scale constructs are consistent. Moreover, judges’ comments and feedback are used to refine the items. The procedure is consistent with Moore and Benbasat’s (1991, 2001) structured sorting process with an additional step for collecting judges’ comments. Moreover, to adapt the scales to another culture, I conducted a focus group discussion on the Chinese version of the instrument and a pilot study with Chinese participants. These steps are compatible with Geisinger’s (1994) suggestions on scale translation.

At the second validation analysis stage, item analysis and factor analysis are conducted to discuss the reliability and validity for each scale in the instrument.
Specifically, the Cronbach’s alpha and Omega are calculated to evaluate the scale’s internal reliability. Item-scale correlations are estimated to check each item’s consistency with the others within the same scale. Standardized factor loadings, and multiple model fit indices, including the chi-square, CFI, RMSEA, and SRMR, provide the construct evidence of validity.

The whole process of development and validation analysis together with the strategies is represented in Table 5.1 and Table 5.2. All the procedures and strategies are consistent with the previous literature. In the literature of instrument validation analysis, item analysis and factor analysis techniques are widely used in the quantitative-dominant phase of instrument validation analysis (Onwuegbuzie, et al, 2010). Especially, confirmatory factor analysis has been most commonly used to analyze the factor structure (Burton & Mazerolle, 2011; Dahodwala, et al, 2012; Melka, et al, 2011; Miller, et al, 2012; Worthington & Whittaker, 2006; Weiss & Smith, 1999).

To sum up, through a systematic and rigorous procedure, the instrument of the study is tested to have good psychometric properties in measuring the diffusion of mixed methods. This is one of the original contributions that the study makes to the literature of mixed methods because no scale exists to measure the expansion of mixed methods. Furthermore, the study also suggests the application of innovation diffusion theory in the field of research methodology. Lastly, the study demonstrates rigorous steps of instrument development using mixed methods. Specifically, the qualitative approach helps with the scale development, whereas the statistical approaches further analyze the scale scores. The steps are summarized in Table 5.1 and strongly recommended to those who are interested in using mixed methods for instrument construction.
**Model Developed in the Study**

The fifth quantitative research question of the study is about how well the newly constructed model illustrates the adoption of mixed methods in China. This is also part of the methodological impact of the study.

In the study, the model of Adoption of Mixed Methods is established, which identifies the influential factors on the adoption of mixed methods. (see Appendix E). According to the model, in countries like China that are at the beginning stage of adopting mixed methods, people’s intentions of adoption are primarily predicted by their perceptions of mixed methods, especially the perceived compatibility of using this method, the advantages of adopting it, and the reasons why it is necessary. In contrast, people’s use of mixed methods is mainly predicted by their experiences with qualitative and quantitative research. In short, the model consists of multiple factors on people’s decisions of adoption, which also implies the effective ways of enhancing mixed methods’ expansion.

The model of Adoption of Mixed Methods is similar to a number of other adaptive technology acceptance models (Davis, 1993; Liaw, 2002; Liaw & Huang, 2003; Moore & Benbasat, 1991; 2001; Oliveira & Martins, 2011; Venkatesh, Morris, Davis, & Davis, 2003). The models from the above literature all identified the significant relationships between adopters’ perceived attributes of an innovation (i.e. compatibility, advantage/usefulness) and their intentions to accept it. Likewise, the current study also confirms such relationship for mixed methods’ diffusion.

Moreover, the model also includes some variables that the technology acceptance model does not usually have, such as research experiences. This kind of amendment is
compatible with a number of previous studies in the technology diffusion area. For instance, Liaw (2002) adapted the technology acceptance model for web use by adding the predictors of users’ web experience, self-efficacy, enjoyment, and perceived web usefulness to users’ behavioral intention to use. Later, Liaw and Huang (2003) further improved the model of web use by incorporating the quality of search system and motivation to use.

To sum up, the current study develops the expansion model of mixed methods through adapting the existed technology acceptance models. The newly developed model also suggests the application of innovation diffusion theory (Rogers, 2003) and technology acceptance model (Davis, 1989) to the context of mixed methods. It contributes to the literature of mixed methods’ expansion and application. This model can be used in the future to investigate mixed methods’ diffusion in other populations.

**Content Impact of the Study**

The first two qualitative and quantitative research questions of the study are about Chinese scholars’ perceptions and use of mixed methods. Both the qualitative and quantitative results of the study address these research questions. The two types of results have merged together to corroborate each other. The study has employed Creswell and Plano Clark’s (2011) recommended mixing approaches of side-by-side comparison and joint display to demonstrate how the two results are converged for the same research questions. As the SAGE Handbook of Mixed Methods Research (2003) defined, the convergent inference in mixed methods research is “when the conclusions or interpretations of two strands of a mixed methods study are consistent with each other (i.e., agree with each other).” (p.705). The details are discussed as follows.
Chinese Perceptions and Intentions of Using Mixed Methods

Perceptions of using mixed methods. As the qualitative findings suggest, Chinese scholars’ acceptance of mixed methods is growing, with an increased number of published mixed methods articles and theses. Consistent with the qualitative findings, the quantitative results indicate the means of participants’ various perceptions of using mixed methods are medium-high (>5 on a 7-point scale). Taken together, Chinese are believed to understand (1) why mixed methods is necessary; (2) how mixed methods is compatible with their current work; and (3) what the advantages of using mixed methods could be to them. Their perceptions of the reasons to use mixed methods, advantage of using mixed methods, and ease of using mixed methods are all very positive.

Reasons to use mixed methods. As Table 5.2 shows, the case study indicated that Chinese scholars have perceived mixed methods as an advanced methodology for investigating complex research phenomena. These qualitative findings were then used to develop the scale of Reasons to Use and used in the quantitative survey phase. The survey results indicated a high level of participants’ agreement with the above qualitative findings. In other words, the initial qualitative findings regarding participants’ perceived reasons of using mixed methods was confirmed in the quantitative phase and expanded to the large sample of Chinese scholars.

Recognizing the reasons to use mixed methods is essential for researchers to adopt this method. Such recognition not only inspires people’s motivations to conduct mixed methods research, but also guides researchers to appropriately design and implement the research. In literature, a number of mixed methods methodologists have claimed that researchers should sufficiently understand the rationales of using mixed
methods before conducting the research (Bryman, 2007; Collins, Onwuegbuzie, & Sutton, 2006). The current study shows that Chinese scholars have well recognized the reasons for and need of using mixed methods, which implies that China has a good start on adoption.

**Advantage of using mixed methods.** Similar to the perceived reasons to use mixed methods, Chinese scholars’ insights into the advantages of using this method are also well developed. Mixed methods is viewed as more helpful, useful, and effective in research in contrast to the use of qualitative or quantitative methods alone. The appreciated benefits of using mixed methods include: effectiveness in solving problems, involvement in the new trend of doing empirical research, improved quality of research results, and a professional image for the researcher. For instance, using mixed methods to conduct research is fashionable and popular. People who use this advanced method are regarded as high professionals in research.

The above mentioned advantages of mixed methods correspond with the definitions of relative advantage by Rogers (2003), “a ratio of the expected benefits and the costs of adoption” and “the subdimensions of relative advantage include economic profitability, low initial cost, a decrease in discomfort, social prestige, a saving of time and effort, and immediacy of reward ” (p. 233). Specifically, using mixed methods can bring economic benefits to researchers because mixed methods proposals seem sophisticated and may easily get funded. O’Cathain et al. (2007) found that British researchers purposefully chose mixed methods when writing proposals for funding because they thought it was fashionable. Creswell (2010) and Dahlberg, Wittink, and Gallo (2010) agreed that many mixed methods projects have been proposed in response
to various funding resources. Plano Clark (2011) reported the funded mixed methods proposals by the National Institute of Health in the United States increased rapidly in the past ten years.

In addition to the economic profitability aspect, mixed methods is also regarded as superior to a mono-method in dissertation writing because mixed methods essays demonstrate students’ knowledge and skills of both qualitative and quantitative approaches. A growing number of graduate students have self-identified their theses and dissertations as mixed methods research since 1980 (Haines, 2011; Plano Clark, 2011). The current study also indicates the growing trend of mixed methods theses and dissertations in China.

In the qualitative case study, participants widely discuss the advantages of using mixed methods in different disciplines in China. In addition, the survey results show a high level of participants’ agreement with the advantages of using mixed methods. The survey also indicates a positive relationship between people’s perceived advantages of mixed methods and their intentions of adoption. Integrating the qualitative and quantitative results, it is convincible that the advantages of using mixed methods are well recognized in China. It is also reasonable to believe Chinese scholars’ positive perceptions of mixed methods’ advantages would enhance its adoption in China.

Compatibility of using mixed methods. The qualitative findings indicated that mixed methods has been used in the disciplines of education, psychology, and social sciences. To expand this finding in a wide range of disciplines, an existing scale of compatibility was modified to measure how well mixed methods fit to Chinese scholars’ current work. According to Rogers’ (2003) definition of compatibility is “the degree to
which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters.” (p. 240) In the study, the sample item includes “using mixed methods is completely compatible with my current situation.” The survey results showed that the participants generally regarded mixed methods quite compatible to their work. Merging the qualitative and quantitative results make a convincing conclusion that mixed methods is feasible to multiple disciplines in China, including education, public health, nursing, management, psychology, and social sciences.

The result regarding mixed methods’ compatibility across disciplines is congruent with the previous findings about the use of mixed methods in sociology, psychology, nursing, management, health sciences, and education in the United States, the United Kingdom, Sweden, and Spain (Fielding, 2010; Johnstone, 2004; Lopez-Fernandez & Molina-Azorin, 2011; O’Cathain, Murphy, & Nicholl, 2007; Ring, Gross, & McColl, 2010). Moreover, the current finding is unique because the compatibility of mixed methods is examined in a developing East Asian country rather than the developed Western countries. The compatibility of mixed methods across disciplines in China suggests the practicality of this methodology in a different culture.

**Ease of using mixed methods.** According to Rogers (2003), the ease of use is called complexity, which is “the degree to which an innovation is perceived as relatively difficult to understand and use.” In literature, the perceived ease of use is not as important as the perceived advantages and computability for the adoption of innovations, but it suggests a very important barrier that hinders adoption (Rogers, 2003).

Initial qualitative findings indicated that Chinese researchers have barriers to using mixed methods due to logistical and feasibility issues. For instance, few journals
have accepted mixed methods papers. It is costly to conduct mixed methods projects. Researchers lack necessary techniques in qualitative and quantitative data analyses.

In the quantitative survey study, a scale has been specified to measure participants’ perceived ease of using mixed methods. The sample items include “overall, I believe that mixed methods is easy to use” and “learning to use mixed methods is easy for me.” The survey results have confirmed the qualitative findings about Chinese scholars’ difficulties in the use of mixed methods. The scale of ease of use was averaged at 4.47 on a 7-point scale and with a standard deviation of 1.64. That said, participants’ perceived ease of using mixed methods is quite varying. Mixed methods seems to be more understandable and manageable to some scholars than to others. Some researchers may have encountered more difficulties than others when using mixed methods in practice. The diversity of perceived ease of use is due to practical issues (e.g., inadequate funding for mixed methods research and scarce possibility for publishing mixed methods papers) and/or the scholars’ skills. These findings are supported by the previous literature, which indicated that researchers’ technical problems, such as methodological preferences and skill specialisms, hindered their effective use of mixed methods (Morgan, 1998).

In the current study, a small but significant relationship is found between the perceived ease of use and participants’ experiences with mixed methods, after controlling people’s research skills. Moreover, the effect of perceived ease of use on participants’ intentions of adoption is fully mediated by their perceived advantages of using mixed methods. That said, when researchers recognize the advantages of using mixed methods, they will adopt this method even though they perceive mixed methods’ complexity.

To sum up, the study shows Chinese scholars’ positive perceptions of using
mixed methods, which make them well prepared for adopting this method. The findings of the study innovatively contribute to the literature because no previous studies have ever quantified people’s perceptions of using mixed methods. The quantified results can provide the methodologists with an overall understanding on people’s evaluation of mixed methods. Taking China as an example, although Chinese scholars generally accept and appreciate the use of mixed methods in research. Accordingly, to enhance the adoption of mixed methods, detailed guidelines should be generated to instruct Chinese scholars to conduct mixed methods research.

**Intentions of using mixed methods.** Chinese scholars have shown high intentions of adopting mixed methods across a variety of disciplines. However, in practice, Chinese scholars have just presented the minimum experiences with mixed methods. It implies that China is at the beginning stage of adoption.

According to Rogers (2003), the innovation-decision process consists of five main steps: “(1) knowledge, (2) persuasion, (3) decision, (4) implementation, and (5) confirmation” (p. 20). The study implies that China is completing the first two steps and undertaking the third step in the adoption process. That is, the majority of Chinese scholars are at the decision stage. Only a few Chinese scholars are at the early implementation stage. Specifically, most Chinese researchers have learned of the existence of mixed methods, gained some understanding of how this method works, and formed a favorable attitude toward it. Many of them intend to try this method. However, few of them have ever had real opportunities to use it due to inadequate knowledge and skills.

According to the study, Chinese scholars’ strong intentions of using mixed
methods reveal their positive decisions of adoption. Researchers’ inadequate contact with mixed methods indicates their early implementations of adoption. As the Table 5.2 indicates, the intentions of adoption are highly achieved, but the current status of using mixed methods is not that optimistic because Chinese scholars have limited experiences with mixed methods. Their contact with qualitative and quantitative is also quite limited. Their limited experiences in qualitative and quantitative research lead to a poor use of mixed methods.

In short, China is best defined as being at the decision stage or preparation stage of adoption. According to McGuire (1989), the adopters in the decision stage are those who intend to try the innovation; whereas the adopters in the implementation stage are those who use the innovation on a regular basis. Prochaska, DiClemente, and Norcross (1992) also called the decision stage “preparation stage” when an individual intends to take action in the immediate future but has not yet done so; whereas the implementation is called action stage, involving individuals’ behavior changes. The results of the study indicate that Chinese scholars are willing to adopt this methodology, but such adoption has not been widely implemented.

Fortunately, although Chinese researchers are inexperienced and unskilled in using mixed methods, it does not decrease their strong interest in adopting this method. They are willing to learn the use of this methodology through course taking, international conferences communication, and collaboration with the mixed methods scholars from other countries. They are very likely to adopt mixed methods in the future, although their current experiences with this method are scarce.

No previous studies have ever used both quantitative and qualitative approaches
to investigate scholars’ intentions to use mixed methods. Researchers usually review the published mixed methods journal articles in a specific discipline over time and over countries, and then suggest the adoption of this method in that field and/or in that country (Collins, Onwuegbuzie, & Sutton, 2006; Leech & Onwuegbuzie, 2011; Ngulube, 2010; Powell, et al., 2008; Truscott, et al., 2010). Compared with the above methodological reviews, the current study has not only examined the published articles in the qualitative case study phase, but also generalized the findings in the follow-up empirical survey. The integration of the qualitative and quantitative results provides a credible interpretation of the adoption of mixed methods in China.

To sum up, merging the qualitative and quantitative results through the side-by-side comparisons and the joint display (Table 5.2), the qualitative and the quantitative findings are analyzed and found to be corroborated and validated by the findings from the other phase. The overall findings about Chinese scholars’ positive perceptions and high intentions of using mixed methods are well demonstrated and quite trustworthy.

The Context on Adoption of Mixed Methods in China

The study consists of three qualitative research questions. Besides the above two questions regarding Chinese scholars’ perceptions and adoption of mixed methods, the third one asks about the cultural context on the adoption of mixed methods in China.

Only since 2001, has China discussed this methodology, which is approximately 20 years later than western countries, such as Germany and Spain. Moreover, only researchers from a few disciplines have used mixed methods. The disciplines that have adopted mixed methods in China are similar to those in the western countries, including education, psychology, management, social sciences, and health sciences (Creswell &
That said, in the same way as researchers from many western countries, Chinese scholars in the above fields have initially recognized the need for using mixed methods. It also indicates that mixed methods is best applicable for the research problems in the above fields in both western cultures and East Asian cultures, such as in China.

However, while western countries have applied mixed methods to a large number of specialized subfields in the past ten years (Creswell, 2009), China only has two fields, education and health sciences, that use mixed methods in their subfields, specifically, higher education, educational technology, long-distance education, and early childhood education in the field of education; and public health and nursing in the field of health sciences. That said, compared with the expansion of mixed methods all over the world, China has accepted mixed methods in a relatively small range of academic areas.

Furthermore, Chinese scholars do not have sufficient knowledge and skills in different types of methodologies to design and conduct rigorous mixed methods research. For instance, they generally use the basic mixed methods designs, including the convergent, explanatory sequential, and exploratory sequential designs. Also, most of the published articles do not show a rigorous process of reporting mixed methods research. Few articles discuss the qualitative coding process and the integration of qualitative and quantitative results.

Chinese scholars’ limited skills in research are probably due to the lack of regular training and practice. Chinese scholars seldom receive training in research and rarely communicate with other scholars regarding mixed methods research. Only in the past several years have Chinese universities made research methodology courses available on
campus to discuss the advanced research philosophies and techniques; and the
governments have encouraged domestic scholars to attend the international conferences
for research updates. While it’s it is a good start, more training and communication is
needed to achieve results.

Another issue that hinders the expansion of mixed methods in China is
summarized as practical matters, such as funding problems and publication concerns.
Although Chinese governments have recently increased their investment in research, the
funding is not enough to provide adequate opportunities for Chinese researchers to
practice their ideas and expertise.

The above findings are new to the literature on the expansion of mixed methods to
East Asian countries. With more information about and understanding of the adoption of
mixed methods in the world, especially in the populous countries like China, mixed
methods methodologists could generate the targeted guidelines and instructions to
improve the use of this methodology across disciplines and across countries.

In short, due to the restricted number of disciplines that have adopted mixed
methods in China as well as the limited skills of Chinese scholars using mixed methods,
China is defined as at the beginning stage of adoption. However, Chinese scholars are
quite enthusiastic about adopting this method in a variety of fields and subfields. If
scholars’ intentions of using mixed methods could be retained, and meanwhile their
expertise of this method could be improved, the adoption would be widely and quickly
enhanced. The following sections specifically discuss the significant factors on Chinese
scholars’ intentions to use mixed methods.
The Influential Factors on Adoption of Mixed Methods

The study consists of five quantitative research questions. Besides the two research questions about Chinese scholars’ perceptions and intentions of using mixed methods as well as two methodological questions about the newly constructed instrument and model, the last quantitative research question in the study is about the influential factors of Chinese scholars’ adoption.

In the study, the factors impacting Chinese scholars’ adoption of mixed methods are identified and examined using the newly developed instrument. A model about the adoption is also specified and finalized to describe the relationships between the factors and participants’ adoption of mixed methods. The influential factors are summarized in Table 5.4, including the factors of intention of adoption, the factors of contact with mixed methods, and relationships between factors.

Factors impacting Chinese scholars’ intentions of adopting mixed methods.

As the quantitative results indicated, the more positive Chinese scholars perceive mixed methods’ compatibility, advantage, and necessity, the greater their intentions of adoption will be. In other words, to maintain Chinese scholars’ interest in using mixed methods, it is better to make them understand: (1) how mixed methods fits to their situation; (2) what benefits mixed methods can bring to them; (3) why mixed methods is necessary.

Among the above three factors, the first one is found to be most influential to Chinese scholars’ intentions of adoption. Compatibility is defined as being consistent with the existing values and beliefs and previously introduced ideas (Rogers, 2003). The existing values and beliefs to a scholar mainly refer to the philosophical paradigm and worldview they have for research. For instance, quantitative researchers generally
believe in post-positivism; whereas qualitative researchers highly value constructivism. In contrast, mixed methods advocate multiple paradigms and pragmatism (Greene & Caracelli, 1997; Greene, 2007; Tashakkori & Teddlie, 2010).

In reality, some Chinese scholars are purists who believe the paradigm-dichotomy, and thus doubt the effectiveness of combining two different types of paradigms. Such doubts are understandable. In the history of mixed methods’ evolution, the period of paradigm debate started in the 1990s when researchers had the fierce arguments on the possibilities of combining two types of paradigms. However, this kind of debate gradually diminishes when more and more social and behavioral researchers have accepted Greene’s (2007) ideas of paradigm pluralism and a dialectic stance on mixing paradigms, and when pragmatism has been recognized as the most suitable paradigm for mixed methods research by at least 30 well-known methodologists in the second edition of SAGE handbook of mixed methods research (Tashakkori & Teddlie, 2010).

To help the paradigm purists to accept mixed methods, methodologists should demonstrate how qualitative methods could fit into the traditional quantitative fields, or vice versa. For instance, Currall and Towler (2003) discussed the use of qualitative approaches to the primarily quantitative field of management and organizational research. Waszak and Sines (2003) argued that qualitative data could be used to augment the experimental methods in the highly quantitative psychology research. Plano Clark, Anderson, Zhou, Wertz, Schumacher, and Miaskowski (in press) examined the potentialities of using qualitative approaches in the quantitative-dominant longitudinal research. Nilsen and Brannen (2010) discussed the use of statistics in the most qualitative area of biographical research. The above literature could not only help
Chinese researchers diminish qualitative-quantitative distinction, but also instruct them to incorporate the new idea of mixed methods to their previous knowledge of research.

Besides the literature, methodologists can also generate practical guidelines for Chinese scholars to conduct mixed methods research. In the fields that mixed methods has never been used before, it is hard for researchers to figure out the correct ways of using this method although they are willing to try it. Previous knowledge and experiences are the mental tools that individuals can utilize to assess new ideas and give them meaning (Rogers, 2003). Accordingly, if the methodologists have discussed the potentialities and designs of using mixed methods in some specific fields, it is easy for the researchers in those fields to follow the guidelines to use mixed methods when it is in need. In other words, it is more important to present researchers the compatibility of mixed methods in specific fields rather than discussing the compatibility of using mixed methods in general. The more specific the discussion is related to various disciplines, the more widely and quickly mixed methods will be adopted across those disciplines.

Besides compatibility, participants’ perceived advantage of using mixed methods also significantly impacts Chinese intentions to adopt this method. These findings are consistent with a number of previous studies about the innovation diffusion (Chang & Tung, 2008; Hardgrave, Davis, & Riemenschneider, 2003; Lee, Hsieh, & Hsu, 2011; Wu & Wang, 2005). These articles have supported that the compatibility and relative advantage are two significant predictors to people’s intentions to adopt an innovation, such as the online learning course, methodologies, and mobile commerce. The current study confirms the impact of compatibility and advantage on the diffusion of mixed methods.
Besides perceived compatibility and advantage, Chinese scholars’ perceived reasons to use mixed methods also significantly impact their intentions of adoption. The finding is consistent with Creswell and Plano Clark (2011) when the authors discussed the need of using mixed methods for different types of research problems. Different from Creswell and Plano Clark (2011), the current study empirically and quantitatively confirms the relationship between perceived reasons and adoption. Thus, the finding of the study is also new to the literature given that no research has examined such relationship quantitatively.

In all, the first hypothesis about six influential factors on Chinese scholars’ intentions to use mixed methods is partially supported because participants’ intentions to adopt mixed methods are only predicted by the perceived compatibility, advantage, and reasons of using mixed methods (see Table 5.5). In contrast, the perceived ease of using mixed methods and the contact with qualitative and quantitative research do not predict adoption.

More importantly, the study demonstrates the application of diffusion theory to the field of mixed methods research. Traditionally, the diffusion of innovation is primarily used in the fields of information technology and communication. The current study brings the concept to the field of research methodology and verifies the feasibility of using the theory to investigate the expansion of mixed methods.

**Factors impacting Chinese scholars’ contact with using mixed methods.** As the above discussion, if Chinese scholars’ intentions of adoption are maintained and their practical experiences with mixed methods are improved, the expansion of mixed methods would be largely enhanced. The factors that improve scholars’ use of mixed methods
included the contact with qualitative and quantitative methods as well as the perceived ease of use. The other three hypothesized factors, namely perceptions of mixed methods’ advantage, reasons to use, and compatibility, do not impact participants’ contact with mixed methods. Thus, the second hypothesis about the six influential factors on Chinese scholars’ contact with mixed methods is only partially supported (Table 5.5).

The contact with qualitative and quantitative methods includes course taking, training (e.g., conferences, workshops), presenting (e.g., publications, lecture speaking), literature reading (e.g., methodology books and journal articles), research investing, and discussing about the method with others. Increase in the contact and expertise with qualitative and quantitative methods would directly increase Chinese scholars’ experiences with mixed methods. Such relationship is consistent with the definition of mixed methods: mixing both qualitative and quantitative methods within a single study (Creswell & Plano Clark, 2011; Greene, 2007; Johnson & Onwuegbuzie, 2004; Leech & Onwuegbuzie, 2009; Tashakkori & Teddlie, 2010; Teddlie & Tashakkori, 2009). Accordingly, researchers’ qualitative and quantitative knowledge and skills are required for a good use of mixed methods.

Currently, Chinese scholars are restricted in using mixed methods due to their insufficient qualitative and quantitative skills. The result corresponds with a number of previous studies, which discussed researchers’ expertise in qualitative and quantitative methods as one of the critical problems in the expansion of mixed methods (Bazeley, 2004; Creswell & Plano Clark, 2011; Tashakkori & Teddlie, 2010). Bazeley (2004) said, “good mixed methods research requires a good working knowledge of the multiple methods being used,” but “researchers brought up in the traditions of a particular
discipline often do not have knowledge of other methodologies” (p. 8). Creswell and Plano Clark (2011) described researchers’ skills as a practical challenge of using mixed methods. They recommended “the researchers first gain experience with both quantitative research and qualitative research separately before undertaking a mixed methods study.” (p. 13)

The current study not only confirms the same problem in China’s adoption of mixed methods, but also quantifies the impact. Moreover, the study specifies what kinds of qualitative and quantitative experiences (i.e., literature reading, course taking, and cooperation with experts) are beneficial to the use of mixed methods. Few studies have discussed the specific knowledge and skills that researchers need to effectively use mixed methods. Some of these practices are consistent with the recommendations from Creswell and Plano Clark (2011), “reading the literature on mixed methods,” “noting the best procedures and the latest techniques,” “taking courses in mixed methods research,” and “apprenticing with someone familiar with mixed methods who can provide an understanding of the skills involved in conducting this form of research” (p. 14). Although Creswell and Plano Clark’s (2011) suggestions are particularly for mixed methods learning, they should also work for those who want to improve their qualitative and/or quantitative expertise. In all, to improve the adoption of mixed methods in a country like China, it is necessary to support scholars’ gains with qualitative and quantitative methods.
Table 5.4

*Influential Factors of Chinese Adoption of Mixed Methods*

<table>
<thead>
<tr>
<th>Adoption Status</th>
<th>Influential Factors</th>
</tr>
</thead>
</table>
| Chinese intentions of using mixed methods | • **Compatibility**: the more compatible using mixed methods in specific disciplines, the higher intentions of adoption  
• **Relative advantage**: the more benefits of using mixed methods to researchers, the higher intentions of adoption  
• **Reasons to use**: the more urgent the need of using mixed methods in reality, the higher intentions of adoption |
| Chinese contact with mixed methods | • **Quantitative expertise**: the more sufficient the quantitative expertise, the more contact with mixed methods  
• **Qualitative expertise**: the more sufficient the qualitative expertise, the more contact with mixed methods  
• **Perceived ease of use**: the more comfort level of using mixed methods, the more contact with mixed methods |

**Relationships between factors.** The study consists of five research hypotheses. The first two hypotheses are about the influential factors on Chinese scholars’ intentions and experience of using mixed methods. The two hypotheses have been discussed as above and also summarized in Table 5.5. The third hypothesis of the study is about the positive relationship between the perceived ease of use and the perceived advantage of using mixed methods (see Table 5.5). The hypothesis is supported by the survey results. The easier participants perceive the use of mixed methods, the more advantages of mixed methods they recognize. Moreover, the compatibility of using mixed methods also positively predicts their perceived advantage. The above two positive effects are compatible with a number of innovation diffusion studies, such as Chang and Tung’s (2008) study of online learning course websites, and Lee, Hsieh, and Hsu’s (2011) study of E-learning systems.

The fourth hypothesis is about the positive association between participants’
intentions of using mixed methods and their contact with mixed methods (see Table 5.5). The hypothesis is supported by the positive and significant bivariate correlation coefficient between the two factors ($r = .19, p < .05$) (see Table 4.8). That said, with more contact with mixed methods, Chinese scholars would have stronger intentions of adopting this method. Also, with a stronger intention of using mixed methods, Chinese scholars would have more contact with this research method.

The fifth hypothesis of the study is about the associations between the following five factors: the perceived compatibility, reasons, and ease of using mixed methods, as well as the experiences with qualitative and quantitative methods (see Table 5.5). Survey results indicated this hypothesis was partially supported. Participants’ perceptions of mixed methods’ compatibility, reasons, and ease of use are related to each other; while participants’ experiences with qualitative and quantitative research are correlated. In contrast, participants’ perceptions of mixed methods are not associated with their experiences with qualitative and quantitative research. That said, regardless of participants’ qualitative or quantitative expertise, their perceptions of mixed methods are not predicted by their research experience. This finding is very optimistic about the expansion of mixed methods, for in such countries as China, though people may not be skilled in qualitative and quantitative methods, their perceptions of using mixed methods are very positive.
Table 5.5

Hypotheses of Chinese Adoption of Mixed Methods

<table>
<thead>
<tr>
<th>Hypotheses in the study</th>
<th>Study Result</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Chinese scholars’ intentions to use mixed methods have been positively predicted by their perceived ease of using mixed methods, mixed methods’ compatibility, advantage, reasons of using mixed methods, as well as their contact with qualitative and quantitative methods.</td>
<td>Partially supported because not all the predictors were significant.</td>
<td>Significant factors: compatibility, advantage, and reasons of using mixed methods.</td>
</tr>
<tr>
<td>2. Chinese scholars’ contact with mixed methods has been positively predicted by their perceived ease of using mixed methods, mixed methods’ compatibility, advantage, reasons of using mixed methods, as well as their contact with qualitative and quantitative methods.</td>
<td>Partially supported because not all the predictors were significant.</td>
<td>Significant factors: quantitative contact, qualitative contact, and perceived ease of use.</td>
</tr>
<tr>
<td>3. Chinese scholars’ perceived advantage of using mixed methods have been positively predicted by their perceived ease, reasons, and compatibility of using mixed methods.</td>
<td>Supported.</td>
<td></td>
</tr>
<tr>
<td>4. Chinese scholars’ contact with mixed methods has been positively correlated with their intention to use mixed methods.</td>
<td>Supported.</td>
<td></td>
</tr>
<tr>
<td>5. Chinese scholars’ perceived ease of using mixed methods, mixed methods’ compatibility, reasons for using mixed methods, as well as their contact with qualitative and quantitative methods have been hypothesized to be associated with each other.</td>
<td>Partially supported because not all the predictors were significantly correlated</td>
<td>Compatibility, reasons, and ease of use were related to each other; while contact with qualitative and contact with quantitative research were correlated.</td>
</tr>
</tbody>
</table>
Expansion of Mixed Methods in China

The study consists of three mixed methods research questions. The first two are about the methodological concerns (generalization and instrument development), which have been discussed in the methodological impact section of the chapter. The third mixed methods research question of the study is about the content of study: how could mixed methods be enhanced and used more widely in China?

As both the qualitative and quantitative results of the study indicated, although Chinese scholars are enthusiastic to adopt mixed methods, their use of this methodology has been largely restricted due to the insufficient expertise of qualitative and quantitative methods. It is believed that China is just one of the many countries that want to adopt mixed methods but struggle with ways to improve their experiences with this methodology. How could methodologists help with the expansion of mixed methods in such countries?

The current study implies that mixed methods would be enhanced and used more widely in China if Chinese scholars’ expertise with qualitative and quantitative research is improved. The study also indicates that course learning and practical work as the two major ways of improving scholars’ expertise. Additionally, scholars are encouraged to attend international conferences and cooperate with mixed methods researchers from other countries. These findings are consistent with the previous studies regarding the training for those who want to use mixed methods. A number of recent studies have discussed what should be taught and what challenges exist in teaching mixed methods.

When Creswell and Plano Clark (2011) discussed the question of researchers’ skills in using mixed methods, they specified what quantitative skills and qualitative
skills are required, in the data collection, analysis, and interpretation processes. They said,

“Mixed methods researchers should be familiar with common methods of collecting quantitative data, such as using measurement instruments and closed-ended attitudinal scales. Researchers need an awareness of the logic of hypothesis testing and the ability to use and interpret statistical analyses, including common descriptive and inferential procedures available in statistical software packages. Finally, researchers need to understand essential issues of rigor in quantitative research, including reliability, validity, experimental control, and generalizability.” (p.13)

Creswell and Plano Clark (2011) also indicated,

“A similar set of qualitative research skills is necessary. Researchers should be able to identify the central phenomenon of their study; to pose qualitative, meaning-oriented research questions; and to consider participants as the experts. Researchers should be familiar with common methods of collecting qualitative text data, including coding text and developing themes and descriptions based on these codes, and should be acquainted with a qualitative data analysis software package. Finally, it is important that researchers understand essential issues of persuasiveness in qualitative research, including credibility, trustworthiness, and common validation strategies.” (p.14)

The above suggested skills should be used as the checklist for researchers to self-assess their skills in doing qualitative and quantitative research. Besides the qualitative and quantitative expertise, mixed methods scholars are also required to learn about the
techniques of combining two different types of methods in a single study.

On one side, researchers are required to gain the research expertise in different types of methods. On the other side, it is very challenging to teach researchers the core qualitative, quantitative, and mixed methods concepts and methods in a minimum number of courses (Tashakkori & Teddlie, 2010). The training challenge has been addressed by a number of mixed methods methodologists, such as Hesse-Biber and Johnson (2013) who discussed the pedagogical issues surrounding teaching students two different methods. They particularly mentioned that there is no prior coursework on teaching mixed methods because the current researchers are the first-generation mixed methods faculty.

To explore the effective ways of teaching mixed methods, Earley (2007) and Christ (2009) published some practical suggestions to the practical teaching. Earley (2007) described the syllabus of a 17-week course of mixed methods research, including the history, typology, integration, validity, and writing-up issues. Christ (2009) evaluated how two courses of mixed methods were designed and taught. The two courses include the overview of qualitative and quantitative methods, as well as the essential issues of mixed methods, such as mixing, typology, rationale, and implementation issues. In short, a number of researchers have examined how to develop and teach mixed methods research courses. With effort, it is believed that the relevant courses will be designed effectively and widely in the future.

To sum up, the expansion of mixed methods has been hindered largely because Chinese scholars do not have adequate experiences with qualitative and quantitative methods. Consistent in much literature, course teaching is believed to be one of the most
efficient ways to improve scholars’ research skills. However, teaching mixed methods research is very challenging because it covers the contents of both qualitative and quantitative methods as well as mixed methods. Fortunately, a number of experienced mixed methods researchers have explored the effective teaching of mixed methods. Information about the senior mixed methods researchers are provided in the recommendations in the chapter VI. In short, if China can catch up with the teaching and learning of mixed methods, the use of mixed methods would be greatly improved.

**Summary**

China is defined as at the beginning stage of adopting mixed methods due to Chinese scholars’ positive perceptions of using this method but poor use of it. The expansion of mixed methods would be widely and quickly enhanced if Chinese scholars’ strong intentions of using mixed methods could be retained, and meanwhile their research expertise could be improved. The identified significant factors and the constructed diffusion model of using mixed methods in the study are consistent with the previous literature and the diffusion theory.

The study consists of three qualitative research questions, five quantitative research questions, five hypotheses, and three mixed methods research questions. All of them are discussed either in the methodological impact section or the content impact section in this chapter. A number of summary tables are also generated to assist the reader to overview the original contributions of the study. For example, Table 5.2 and Table 5.4 summarize the influential factors of Chinese adoption of mixed methods, and Table 5.5 summarizes the quantitative hypotheses of the study.
CHAPTER VI
CONCLUSION

The conclusion chapter generates the recommendations for those methodologists who are interested in the development of mixed methods and for those practitioners who want to advance the use of this method. The chapter also concludes the important steps in constructing scales. Lastly, the chapter summarizes the limitations of the study, suggests future research, and indicates the implications of the study.

Recommendations for Expansion of Mixed Methods

In a country like China that is at the beginning stage of adopting mixed methods, adopters normally have positive perceptions of using this method and high intentions to adopt it, but deficient usage due to insufficient research techniques and certain logistical issues, such as funding and publication. Accordingly, to enhance the expansion of mixed methods in these countries, we should keep the adopters’ enthusiasm for using the method and meanwhile increase their experiences with this method.

Practically, adopters’ positive perceptions and high intentions of adoption can be maintained if they can best understand the compatibility of using mixed methods in their specific research areas, appreciate the needs of using this method in research, and recognize the benefits of using this method. Moreover, adopters’ actual use of mixed methods would be improved if they gain adequate qualitative and quantitative expertise and feel comfortable in using mixed methods.

Therefore, here are the specific recommendations to the methodologists and adopters who wish to expand mixed methods (Also see Appendix H).
1) Disciplines need to train their researchers in the design and implementation of mixed methods, and demonstrate the literature about the use of mixed methods in their areas.

2) Senior researchers should help the next generation of researchers obtain the necessary skills of qualitative and quantitative approaches.

3) Teamwork and collaboration are necessary for researchers to conduct mixed methods research if the individual scholar does not have qualitative, quantitative, and mixed methods expertise.

4) To advance the use of mixed methods, one should fully understand and explicate the rationales of mixing, the techniques of integration, and the implementation procedures.

5) Multiple ways are suggested to those who want to improve the knowledge and skills in mixed methods, including courses, workshops, readings, international conferences, and international collaborations.

6) When selecting readings about mixed methods, one should review the most recent literature, examine empirical mixed methods studies in the specific disciplines, and read authoritative books and journals about mixed methods, including the *SAGE Handbook of Mixed Methods*, *Journal of Mixed Methods Research*, *International Journal of Multiple Research Approaches*, and the works of well-known mixed methods researchers and methodologists, including John Creswell, Jennifer Greene, Donna Mertens, Janice Morese, Linda Niehaus, Tony Onwuegbuzie, Vicki Plano Clark, Abbas Tashakkori, Charles Teddlie, et al.
Recommendations for Instrument Development and Validation Analysis

Exploratory sequential mixed methods research design is recommended for instrument development because the initial qualitative study can provide the targeted and detailed information about the topic. First of all, the initial qualitative findings can facilitate the accurate writing of items, such as converting qualitative codes, subcodes, or quotes into items. The creation of item pools based on the qualitative findings is believed to be precise to the research population and research topic under study.

Second, the initial qualitative findings can provide the testable structure of the constructs by converting the themes, subthemes, or codes to scales. The underlying logic of grouping codes to themes in qualitative study is similar to the grouping process in exploratory factor analysis. In other words, the qualitative theme, along with the codes and quotes, imply the structure of the scale with its items. Then, the factor structure that is suggested by the qualitative findings is ready to be further tested in the follow-up confirmatory factor analysis. Accordingly, exploratory factor analysis is not necessary before conducting the confirmatory factor analysis if using the exploratory instrument design, for the factor structure is already specified based on the qualitative findings.

Confirmatory factor analysis is used to analyze the newly developed instrument in the second stage of instrument validation analysis. The first stage of validation analysis occurs during the development process. Specifically, the content evidence of validity is provided through researchers’ reviewing the relevant literature, converting the qualitative findings to items and scales, and a panel of experts’ discussing the contents. Moreover, the content and construct evidence of validity is provided in the sorting procedure, during which judges are required to categorize the items to scales. In other words, during the
rigorous instrument development process, the validity of scales is discussed to some extent.

The second stage of validation analysis primarily involves statistics analyses. Confirmatory factor analysis is one of the most advanced techniques to test the factor structure of the newly developed instrument. The construct evidence of validity of the instrument will be provided if the data fit the model well. Multiple model fit indices are usually used in the evaluation, including the chi-square value, comparative fit index, standardized root mean square residual, and root mean square error of approximation. Besides the model fit, other statistics are also commonly reported as the construct evidence of validity, such as item-total correlations, standardized factor loadings, and group invariance test results. Normally, the Cronbach’s alpha of the internal reliability is estimated and reported to validate the scales because reliability is a necessary though not sufficient condition to validity.

Taken together, the recommended seven steps of using exploratory sequential design to develop and validate scales are as follows and also in Appendix I. Compared the Onwuegbuzie, Bustamante, and Nelson’s (2010) ten-phase process of instrument development, the following suggested steps are more detailed and practicable to the exploratory instrument design.

1. The investigators should fully understand the rationales and the typical procedures of using exploratory design for instrument development.
2. Conduct a rigorous qualitative study, such as case study, grounded theory, etc.
3. Work with those who have psychometric expertise for instrument development and those who have advanced statistics skills for instrument validation analysis.
4. In the instrument development process (also the first-stage of validation analysis):

01) Discuss what you want to measure.
02) Write the items based on the initial qualitative findings and literature reviews.
03) Explicate the conversion from qualitative findings to scales and items.
04) Discuss why you think the generated items and scales can measure what you want to measure, which involves a discussion of specifying the structure of the scales and a discussion of construct validity.
05) Determine the format of the item response and the visual display of the instrument.
06) Have a panel of experts review the item pool to assess item quality to provide content evidence of validity (representativeness and completeness).
07) Revise the items according to the panel’s feedback.
08) Invite other experts to sort the revised items to scales to collect construct evidence of validity.
09) Interview a focus group about the translation adaptation if needed.
10) Conduct a pilot study, and interview the participants for feedback.
11) Analyze the items, including the internal reliability of Cronbach’s alpha (conventionally higher than .70), inter-item correlations (conventionally higher than .50), scale variance (should be high), and corrected item-total correlations (should be positive and conventionally higher than .20/.30).
12) Determine, revise, and/or delete the poor items according to the pilot study results.
13) Conduct another pilot study, and repeat the above steps in need.
5. Administer the newly developed instrument in the follow-up quantitative study, such as survey.

6. In the second stage of instrument validation analysis process (using quantitative data):
   01) Estimate the internal reliability (Cronbach’s alpha and inter-item correlations) of the scales because reliability is a necessary condition for validity.
   02) Conduct confirmatory factor analysis to examine the specified factor structure of the scales and the overall instrument.
   03) Examine multiple model fit indices (Chi-square, CFI, RMSEA, SRMR) to verify the structure of the instrument.
   04) Estimate the standardized factor loadings (conventionally higher than .30/. 40) to examine the relationships between items and its scale.
   05) Estimate the convergent and discriminant validity of the scale scores (for the convergent evidence of validity, check the item factor loadings, composite reliability, average variance extracted, inter-item correlations, and model fit; for the discriminant evidence of validity, check the model chi-square different test, factor correlations, inter-item correlations, and group comparison).
   06) Conduct a series of group invariance tests to test if the instrument is unbiased.
   07) Delete or revise the poor items according to the above statistics results.
   08) Conduct another run of the survey with the revised items in need.
   09) Repeat the above steps until the new instrument with satisfactory psychometric properties.
7. Discuss the integration of qualitative and quantitative approaches in the study, and how the integration enhances the rigorousness of the instrument development and validation analysis.

**Limitations**

The study follows the important steps in developing the scales of the diffusion of mixed methods except for several limitations, such as the measurement invariance test. First, the study should test the invariance of the instrument in the three Chinese universities to verify that the instrument is unbiased and can be used for other Chinese universities. This is one of the major limitations of the study due to the small sample size (n<100) of each group of participants. Second, the study should also test the invariance of the instrument between faculty members and graduate students. However, the faculty participants in the study were fewer than 100. The measurement invariance test results cannot be trusted due to the small sample size. Thus, the invariance test was not conducted in the study.

The third concern about the measurement model was mainly for the scales with only three items. It was impossible to test whether the measurement model fit the data due to the saturation in the structure. The final instrument has three such scales (Compatibility, Intension to Use, and Reasons to Use). Due to the small number of items, these scales might also not represent their domains in a complete way.

Fourth, another issue of the instrument construction in the study concerns the scale removal. Due to the limited time of the study, the poorly constructed scales were directly removed without further revisions. Therefore, future research is suggested to test the invariance of the scales with a large enough sample, and to continually work on the
removed scales with further revisions.

Another limitation of the study is that the results about the expansion of mixed methods in China might not represent the entire situation due to the limited participants under study. Specifically, although the initial case study analyzed multiple sources of data, such as the published mixed methods articles, theses, and individual interviews, all the data were restricted to East China, which did not characterize the use of mixed methods in other parts of China. Then, although the survey investigated scholars from other parts of China, the results were mainly reported by Chinese professors and graduate students, which might not represent those scholars who do not work in higher education.

The third limitation of the study involves the convenience sampling in the survey phase. Although the three Chinese universities were randomly chosen, the participants in these universities were conveniently selected. Thus, these participants might not represent the Chinese professors and graduate students as a whole.

Lastly, the newly developed instrument is only examined in China. It might not work as well for other countries as it does for China. It might only be feasible in the context of East Asian cultures. However, without testing the instrument in other East Asian countries, it is hard to define its feasibility and utility.

In all, there are a number of inquiries that could have been done if the study were not restricted by the range and number of samples. Nevertheless, the above limitations also inform the directions for the future research.

**Future Research**

The study examined the expansion of mixed methods in China, and constructed an instrument for the diffusion of mixed methods. Due to the limited time and funding,
the study has not investigated the expansion of mixed methods in specific disciplines in China. This could be a desired research topic that involves the application and compatibility of mixed methods in different disciplines. As the study suggests, the compatibility of using mixed methods is critical to Chinese scholars’ acceptance and adoption of mixed methods. The application of mixed methods in specific disciplines helps with the development of this method. Thus, future research is needed to investigate the expansion of mixed methods in specific disciplines. Moreover, the study only investigated one developing East Asian country. Future research is needed to study more East Asian countries to describe and verify the usage and practicality of mixed methods in the East Asian culture context.

Lastly, future research can continue testing the instrument that is developed in the study when researchers investigate the expansion of mixed methods in other populations and other East Asian countries. For instance, the scales should be further tested in different groups of Chinese scholars other than those in universities, and/or Chinese scholars from non-comprehensive universities for the generalizability of the instrument. Certainly, the scales also need to be further verified in the other East Asian countries. Besides the generalizability, the invariance test of the instrument is also required. Future research can test the group invariance of the instrument between Chinese scholars and the scholars from other countries. In short, future research is suggested to focus on improving the instrument particularly through the invariance test and the generalizability test, as well as examining the expansion of this method across disciplines and in different East Asian countries.
Implications of the Study

One of the major contributions of the study to the field of mixed methods is the construction of the measures and model of the expansion of this method. No previous scales are available to measure individuals’ perceptions and use of mixed methods. No model has ever existed to indicate the relationships between the relevant factors and the adoption of mixed methods. The current study provides a testable instrument and model that can be used to investigate the expansion of mixed methods. The scales in the study can be used to examine scholars’ perceptions of mixed methods, including its relative advantage, compatibility, complexity, and necessity, scholars’ intentions to use this method, as well as scholars’ experiences with qualitative, quantitative, and mixed methods research. The model in the study describes the relationships of individuals’ perceptions and contact with mixed methods in the process of adoption. The model can be used for future investigations into the expansion of mixed methods across disciplines and countries.

Another major contribution of the study to the literature of mixed methods is the exploration of mixed methods’ feasibility and application in an East Asian country. Very few studies have discussed how mixed methods has been accepted and used in the countries other than western countries. Methodologists’ understanding of mixed methods’ feasibility in Asian countries has been very limited. The current study explores Chinese scholars’ perceptions of mixed methods in different aspects and their intentions and experiences of using this method. The study also discusses the influential factors on the expansion of mixed methods in China. Moreover, the investigation of mixed methods in China implies the practicability of this method in East Asian cultures. That said,
although mixed methods initially emerged in the Western countries, it is also applicable to the research in Eastern cultures. In short, the study contributes original and unique information to the literature on the expansion of mixed methods.

Lastly, the study demonstrates the use of exploratory design in instrument development and validation analysis. It illustrates the advantages of using qualitative and quantitative approaches in the instrument construction process. More importantly, the study also recommends the practical steps in instrument construction from research design to implementation, including the distinctive but interactive steps in instrument development and instrument validation analysis. Likewise, the recommended seven-step process is specific to mixed methods research design and clearly demonstrates how Creswell and Plano Clark’s (2010) exploratory design work in practice to develop an instrument.

With the establishment and future improvements of the measures of the adoption of mixed methods, the investigation of mixed methods’ expansion is believed to be very efficient and enriched. With more researchers work on the expansion of mixed methods across disciplines and across countries, this method will be adopted quickly and widely.
References


Psychological Review, 111(4), 1061-1071.


Edmeades, J., Nyblade, L., Malhotra, A., MacQuarrie, K., Parasuraman, S., & Walia, S.


Huang, B. & Xiang, G. (2008). 高校教育技术的研究现状及其发展趋势：《现代教育
技术》2001 年-2007 年发文统计分析 [Analysis of contemporary research and development trend of educational technology in universities: A survey of articles published in modern educational technology from 2001 to 2007].

*Modern Educational Technology, 18*(1), 28-35.


Johnstone, P. L. (2004). Mixed methods, mixed methodology health services research in
practice. *Qualitative Health Research, 14*(2), 259-271.


Lee., Y., Hsieh, Y., & Hsu, C. (2011). Adding innovation diffusion theory to the technology acceptance model: Supporting employees’ Intentions to use E-


Liu, X. (2009). 教育学科领域研究方法的现状及发展趋势探析 [Analysis of the


Retrieved on Dec. 22, 2011, from
Renwuku. (n.d.). 人物库 [Characters library]. Retrieved on Nov. 7th, 2011, from
http://www.1000plan.org/wiki/

23674-aid-158849.html

increased use of mixed methods for quality of life research. *Quality of Life
Research, 19*, 613-615.

Schuster, Inc.

Sandelowski, M. (2000). Focus on research methods combining qualitative and
quantitative sampling, data collection, and analysis techniques in mixed-method

Sartori, R., & Pasini, M. (2007). Quality and quantity in test validity: How can we be sure
that psychological tests measure what they have to? *Quality & Quantity, 41*, 359-
374.

Schifferdecker, K., & Reed, V. (2009). Using mixed methods research in medical

research for physiotherapy. *Physiotherapy Theory and Practice, 26*(8), 510-518.


Tian, H. (2007). 我国高等教育研究方法的现状、问题及出路 [Status and relative issues of research methods in Chinese higher education], HuaZhong Technology University, 65-70.


Appendix A

Informed Consent Form for Telephone Interview

Title of Project:
The Adoption of Mixed Methods in China

Purpose of the Research:
Mixed methods research is combining both qualitative and quantitative approaches in single study (Creswell, 2007). The purpose of this study is to examine the adoption of mixed methods in China. In particular, the research is interested in learning about (a) the current status of mixed methods used in China, and (b) how researchers use mixed methods in their studies.

Procedures:
You are invited to participate in a one-on-one telephone interview about your use of mixed methods. Participation in an interview will require no more than 60 minutes of your time. The interview will be completed via telephone at a time that is convenient to you. During the interview, I will be asking you questions about your experiences with using mixed methods in research and your perception on using mixed methods. I will also be audio taping the interview for the purpose of transcription of the conversation. The interview will be transcribed and confidentiality will be maintained when the results are reported through use of pseudonyms and numbers. Audio files will be stored on password-protected storage device in a locked filing cabinet and will be destroyed after the completion of the transcription process.

You will also be invited to share any documents that they feel may be relevant to understanding their use of mixed methods. It will be up to you to decide whether you want to share any additional information about your research project.

Risks and/or Discomforts:
There are no known risks associated with participating in this study.

Benefits:
Although you may enjoy the opportunity to discuss your research efforts, there are no specific benefits that you will receive from participation. By better understanding the practice of designing and conducting mixed methods research, the results of this study may suggest guidance to investigators designing mixed methods studies in China, and add insights on conducting rigorous mixed methods studies to the mixed methods literature.

Confidentiality:
Any information obtained during this study that could identify you will be kept strictly confidential by the project investigators. Pseudonyms and numbers will be used to identify participants, institutions, and projects in place of actual names and titles. Interviews will be audio recorded, but the audio recording will be done solely for the
purposes of completing transcriptions. Transcriptions will be prepared by the PI, and all identifying characteristics will be deleted. All personal notes and any documents that the researchers may obtain during the study will be stored in the locked filing cabinet in the principal investigator’s office. Audio files will be destroyed immediately upon the completion of the transcription. The results of the research will be disseminated via professional journals, conferences, and may help form the basis of for requests for additional research funding requests, but no identifying characteristics of participants will be revealed throughout these endeavors.

Compensation:
There is no compensation for participation in an interview or sharing documents.

Opportunity to ask questions:
You may ask any questions concerning this research and have those questions answered before agreeing to participate in or during the interview. You may contact the investigators at any time using the contact information listed at the bottom of this form. Please contact the University of Nebraska-Lincoln Institutional Review Board at (402) 472-6965 for the following reasons: you wish to talk to someone other than the research staff to obtain answers to questions about your rights as a research participant, to voice concerns or complaints about the research, to provide input concerning the research process, or in the event the study staff could not be reached.

Freedom to withdraw:
Participation in this study is voluntary. You can refuse to participate or withdraw at any time without harming your relationship with the researcher or the University of Nebraska-Lincoln, or in any other way receive a penalty or loss of benefits to which are otherwise entitled.

Consent:
You are voluntarily making a decision whether or not to participate in the interview associated with this research project. Your indication of your agreement to participate in the reply email certifies that you have decided to participate having read and understood the information presented.

Name and Address of Investigators
Yuchun Zhou, Research Assistant
Office phone: (402) 472-9108
E-mail: yzhou@huskers.unl.edu
John Creswell, Professor
Office phone: (402) 472-2248
E-mail: jcreswell1@unl.edu
Appendix B

Sample Interview Protocol

Interviewee ID: ________________________________
Date: ________________________________________
Time: ________________
Interviewer: __________________________________

Introduction:

Hello, Mr./Ms. _______. Thank you for taking the time to talk to me today about your experiences and perception on the use of mixed methods in research. Before we begin, I want to remind you that I am planning to record our conversation today. Do I still have your permission to make the audio recording?

[Note response] __________________________________________________

I want to assure you that your identity will be kept strictly confidential. I will be asking you a number of questions so please feel free to discuss your ideas and views. Are you ready to begin?

Interview Questions:

Examples of the types of questions to be asked are as follows. Additional questions and probing may occur in response to the interviewee’s comments, but all questions will focus on participants’ experiences and perception on the application of mixed methods in his/her research.

1. First, tell me a little about your professional background such as your training and research interests. [icebreaker question]

2. Tell me what the term mixed methods means to you?

3. Tell me why you chose mixed methods for your research?

4. What were your experiences with using mixed methods in your research area?

5. What issues related to the use of mixed methods have you experiences so far?
6. How do you think mixed methods is used in China?

7. What advice do you offer to other Chinese researchers considering using mixed methods in research?

8. What documents are you willing to share with me for me to better understand your experiences in using mixed methods?

9. What else can you add to help me understand your use of mixed methods?

Thank you very much for participating in this study. Your time and insights are greatly appreciated!
Appendix C

Informed Consent Form for Survey

Title of Project:
The Diffusion of Mixed Methods in China

Purpose of the Research:
Mixed methods is defined here as the combination and integration of quantitative and qualitative approaches in the same study (Creswell & Plano Clark, 2007; Creswell & Plano Clark, 2011). The purpose of this study is to investigate the diffusion of mixed methods in China. In particular, the research is interested in learning about (a) to what extent Chinese scholars have accepted mixed methods, and (b) what factors have influenced the diffusion of mixed methods in China.

Procedures:
You are invited to participate in a survey about your acceptance of mixed methods (quantitative and qualitative methods). Participation in the survey will require no more than 10 minutes of your time. The survey will be completed at a time that is convenient to you. During the survey, you will be asking questions about some demographic information (e.g. age, gender, discipline, etc.), your understanding of mixed methods, your attitudes toward using mixed methods, and your intention of using mixed methods in the future. Your personal information and answers will be kept confidentially when the results are reported through use of pseudonyms and numbers. Data will be stored on password-protected storage device in a locked filing cabinet and will be destroyed after the completion of the study.

Risks and/or Discomforts:
There are no known risks associated with participating in this study.

Benefits:
Although you may enjoy the opportunity to discuss your research efforts, there are no specific benefits that you will receive from participation. By better understanding the designing and conducting mixed methods research, the results of this study may suggest guidance to investigators using mixed methods in China, and add insights on diffusion and development of mixed methods to the methodology literature.

Confidentiality:
Any information obtained during this study that could identify you will be kept strictly confidential by the project investigators. Pseudonyms and numbers will be used to identify participants, institutions, and projects in place of actual names and titles. All data will be stored in the locked office of the principal investigator. No one other than the research team will have any access to the data obtained. All data files will be destroyed after the study is completed. The results of the research will be disseminated via professional journals, conferences, and may help form the basis of for requests for additional research funding requests, but no identifying characteristics of participants will
be revealed throughout these endeavors.

**Compensation:**
There is no compensation for participation in a survey.

**Opportunity to ask questions:**
You may ask any questions concerning this research and have those questions answered before agreeing to participate in or during the survey. You may contact the investigators at any time using the contact information listed at the bottom of this form. Please contact the University of Nebraska-Lincoln Institutional Review Board at (402) 472-6965 for the following reasons: you wish to talk to someone other than the research staff to obtain answers to questions about your rights as a research participant, to voice concerns or complaints about the research, to provide input concerning the research process, or in the event the study staff could not be reached.

**Freedom to withdraw:**
Participation in this study is voluntary. You can refuse to participate or withdraw at any time without harming your relationship with the researchers, your school, or the University of Nebraska-Lincoln, or in any other way receive a penalty or loss of benefits to which are otherwise entitled.

**Consent:**
You are voluntarily making a decision whether or not to participate in the survey. Your indication of your agreement to participate at the beginning of the survey certifies that you have decided to participate having read and understood the information presented.

**Name and Address of Investigators**

Yuchun Zhou, Research Assistant  
Cell: +86-13881861658  
Office phone: (402) 472-9108  
E-mail: yzhou@huskers.unl.edu

John Creswell, Professor  
Office phone: (402) 472-2248  
E-mail: jcreswell1@unl.edu
Appendix D

The Self-Assessment Questionnaire

Informed Consent

You are invited to participate in a survey about your acceptance of mixed methods (quantitative and qualitative methods). In this study, mixed methods is defined as the combination and integration of quantitative and qualitative approaches in the same study (Creswell & Plano Clark, 2007; Creswell & Plano Clark, 2011).

Participation in the survey will require no more than 10 minutes of your time. The survey will be completed at a time that is convenient to you. During the survey, you will be asking questions about some demographic information (e.g. age, gender, discipline, etc.), your understanding of mixed methods, your attitudes toward using mixed methods, and your intention of using mixed methods in the future. Your personal information and answers will be kept confidentially when the results are reported through use of pseudonyms and numbers.

You may ask any questions concerning this research and have those questions answered before agreeing to participate in or during the survey. Contact the researcher: Yuchun Zhou, yzhou@huskers.unl.edu; +86-13881861658.

There is no compensation for participation in the survey, nor known risks. Participation in this study is voluntary. You can refuse to participate or withdraw at any time without harming your relationship with the researchers, your university, or the University of Nebraska-Lincoln, or in any other way receive a penalty or loss of benefits to which are otherwise entitled.

You are voluntarily making a decision whether or not to participate in the survey. Your indication of your agreement to participate at the following question certifies that you have decided to participate having read and understood the information presented.

Are you willing to participate in the survey?

___ Yes. I will participate in the survey.

___ No. I do not want to participate in the survey.

If you choose “Yes” at the above question, please go ahead to the next page. Otherwise, please stop here. Thanks anyway!
Thanks for participating in the study!

I. Demographic Information

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Gender</strong></td>
<td><strong>2. Age</strong></td>
</tr>
<tr>
<td>a. F</td>
<td>a.__________</td>
</tr>
<tr>
<td>b. M</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3. Current Position/Academic Status:</strong></td>
<td><strong>4. Discipline</strong></td>
</tr>
<tr>
<td>a. Master students</td>
<td>a. Education</td>
</tr>
<tr>
<td>b. Doctoral students</td>
<td>b. Sociology</td>
</tr>
<tr>
<td>c. Assistant professor</td>
<td>c. Health Science</td>
</tr>
<tr>
<td>d. Associate professor</td>
<td>d. Psychology</td>
</tr>
<tr>
<td>e. Professor</td>
<td>e. Business</td>
</tr>
<tr>
<td>f. Researcher</td>
<td>f. Arts</td>
</tr>
<tr>
<td>g. Others (please specify):</td>
<td>g. Sciences</td>
</tr>
</tbody>
</table>

II. Relevant Research Experiences

Please give a numeric answer to the following questions.

5. How many courses did you take to learn about this methodology?

<table>
<thead>
<tr>
<th>Qualitative Research</th>
<th>Quantitative Research</th>
<th>Mixed Methods Research</th>
</tr>
</thead>
</table>
6. How many training occasions (including conferences, workshops, lectures, and seminars) did you attend to learn about this methodology?

<table>
<thead>
<tr>
<th>Qualitative Research</th>
<th>Quantitative Research</th>
<th>Mixed Methods Research</th>
</tr>
</thead>
</table>

7. How many studies did you participate in using this methodology?

<table>
<thead>
<tr>
<th>Qualitative Research</th>
<th>Quantitative Research</th>
<th>Mixed Methods Research</th>
</tr>
</thead>
</table>

8. How many times did you present this type of research (including publishing papers, presenting at conferences, and speaking at lectures)?

<table>
<thead>
<tr>
<th>Qualitative Research</th>
<th>Quantitative Research</th>
<th>Mixed Methods Research</th>
</tr>
</thead>
</table>

9. How many articles (including book chapters) did you read about this methodology?

<table>
<thead>
<tr>
<th>Qualitative Research</th>
<th>Quantitative Research</th>
<th>Mixed Methods Research</th>
</tr>
</thead>
</table>

10. How many times did you talk with others about using this methodology?

<table>
<thead>
<tr>
<th>Qualitative Research</th>
<th>Quantitative Research</th>
<th>Mixed Methods Research</th>
</tr>
</thead>
</table>
III. Your Perceptions of Using Mixed Methods

*Please indicate how strongly you agree or disagree with the following statements? From 1 = strongly disagree to 7 = strongly agree*

<table>
<thead>
<tr>
<th>Items</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. I would have difficulty explaining why using mixed methods may or may not be beneficial to research.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>12. I am good at analyzing qualitative data.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>13. I am very confident in designing a mixed methods research project.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>14. It is very unlikely to publish mixed methods studies in my field.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>15. The benefits of using mixed methods are apparent to me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>16. I am good at analyzing quantitative data.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>17. I think that using mixed methods fits well with the way I like to work/research.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>18. I predict I would use mixed methods in the future.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>19. I would have no difficulty telling others about the results of using mixed methods.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>20. I like using mixed methods.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>21. I am very confident in doing qualitative research.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>22. I am very confident in doing quantitative research.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>23. It is impossible to get mixed methods projects funded in my discipline.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>24. Overall, I believe that mixed methods is easy to use.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>25. It is impossible to do mixed methods research by myself without any collaborators.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>26. I believe I could communicate to others the consequences of using mixed methods.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>27. Using mixed methods enables me to accomplish tasks more quickly.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>28. I believe that it is easy to use mixed methods to get my research questions answered.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>29. Using mixed methods makes it easier to do my job/research.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>30. I intend to use mixed methods in the future.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>31. Learning to use mixed methods is easy for me.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>32. Using mixed methods gives me greater control over my research process.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>33. Using mixed methods fits into my work/research style.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>34. Using mixed methods is a bad idea in my field.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>35. Using mixed methods is completely compatible with my current situation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>36. I plan to use mixed methods in the future.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>37. Using mixed methods is fun.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>38. Using mixed methods improves the quality of work/research I do.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>39. In my field, I see people using mixed methods.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>40. Using mixed methods is extremely time-consuming.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>41. I have no problems in mixing qualitative and quantitative results.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>42. Mixed methods is not very visible in my academic field.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>43. Mixed methods makes work more interesting.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>44. Using mixed methods enhances my effectiveness on the job/research.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Using mixed methods can provide a complete understanding of research problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>45</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>46</td>
<td>Using mixed methods can solve complex research problems.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>The weaknesses of one research method can be offset by the strengths of the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>other research method.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>The use of mixed methods is clear and understandable to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


自我评估问卷

知情同意

我们邀请您参与一项问卷调查，内容是有关您对混合方法（量化和质性方法，定量和定性方法）的接受度。混合方法的定义为：在同一项研究中，既使用了量化手段，又使用了质性方法。

完成该问卷的时间不会超过10分钟。您可以选择您的时间内完成问卷。该问卷会问您一些个人信息问题，如年龄，性别，和学科等，也会问及您对混合方法的理解，态度，以及您今后是否打算使用混合方法。您的个人信息将被严格保密。报告内容将使用化名和数字代替您的名字等个人信息。所有的研究数据将被存放在带密码的存储设备中并被锁在柜子里。在研究结束后，这些数据将被立即销毁。

在参与这个研究的过程中，您可以在任何时候对此研究提出问题。您可以联系研究者：

周玉春，yzhou@huskers.unl.edu; +86-13881861658。

这个研究对参与者没有私下的回报，也没有预知的风险。

请您自愿决定是否接受该问卷调查。如果您愿意，请您在以下问题中勾选您已经被告知该研究项目的相关信息和内容，并同意参与该研究。

你同意参加这个研究吗？

是。我同意参加。

不。我不想参加。

如果你选择了“是”，请继续下一页的问卷调查。如果没有，请停笔。感谢您的时间！
有关研究方法的问卷调查

我们邀请您参与一项问卷调查，内容是有关您对研究方法（质性研究，量化研究，和混合方法研究）的接受度。完成该问卷的时间大约 10 分钟。该问卷包括三大部分：您的基本信息，相关的研究经历，以及您对混合方法的看法。

质性研究，即研究者通过观察和访谈等方法收集文字或图片等信息，通过编码进行数据分析，以回答所研究的问题。常见的数据收集方法还包括：焦点小组访谈，案例研究，和文献综述等。

量化研究，即研究者通过问卷，试题，或实验等方法收集数字信息，以回答所研究的问题。数据分析主要采用统计手段，包括百分比，方差，t-test，小组比较，回归分析，和结构方程式等。

混合方法研究，即研究者在一项研究中同时使用以上两种研究方法，收集两种类型的数据，综合两种数据分析结果，多方面地回答所研究的问题。

I. 基本信息

<table>
<thead>
<tr>
<th>1. 性别</th>
<th>2. 年龄</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 女性</td>
<td>a. ____________</td>
</tr>
<tr>
<td>b. 男性</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3. 当前学历/职业：</th>
<th>4. Discipline 学科领域：</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Master students 硕士研究生</td>
<td>a. Education 教育学</td>
</tr>
<tr>
<td>b. Doctoral students 博士研究生</td>
<td>b. Sociology 社会学</td>
</tr>
<tr>
<td>c. Assistant professor 高校助教 / 讲师</td>
<td>c. Health Science 健康科学</td>
</tr>
<tr>
<td>d. Associate professor 副教授</td>
<td>d. Psychology 心理学</td>
</tr>
<tr>
<td>e. Professor 教授</td>
<td>e. Business 商科</td>
</tr>
<tr>
<td>f. Researcher 研究员</td>
<td>f. Arts 人文科学</td>
</tr>
<tr>
<td>g. Others (please specify): 其他: 请指明 ____________</td>
<td>g. Sciences 理科</td>
</tr>
<tr>
<td></td>
<td>h. Engineers 工程学</td>
</tr>
<tr>
<td></td>
<td>i. Technology 技术学</td>
</tr>
<tr>
<td></td>
<td>j. Others: please specify 其他: 请指明专业领域 ____________</td>
</tr>
</tbody>
</table>
II. 相关的研究经历
这部分的题目包括以下三种类型的研究经历：质性研究，量化研究，和混合方法研究。在回答这一部分的题目时，请按照您自身的经历给出一个数字作为答案。如果您不能准确地记住所经历的次数，请给出一个大概相近的数字。

5. 你学过多少门与以下研究方法相关的课程？（比如：统计课是与量化研究相关的课程）

<table>
<thead>
<tr>
<th>质性研究</th>
<th>量化研究</th>
<th>混合方法研究</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. 除课程外，你还参加过多少次与以下研究方法相关的课外学习（包括：学术会议，短期培训班，讲座，研讨会）？

<table>
<thead>
<tr>
<th>质性研究</th>
<th>量化研究</th>
<th>混合方法研究</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. 你参加过多少项以下类型的研究？

<table>
<thead>
<tr>
<th>质性研究</th>
<th>量化研究</th>
<th>混合方法研究</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. 你曾多少次展示过以下类型的研究结果（展示的方式包括：发表期刊文章，撰写研究报告，进行会议讲演，进行小组汇报，和开办学术讲座）？

<table>
<thead>
<tr>
<th>质性研究</th>
<th>量化研究</th>
<th>混合方法研究</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9. 你阅读过多少与以下研究方法相关的文章和书籍？

<table>
<thead>
<tr>
<th>研究方法</th>
<th>质性研究</th>
<th>量化研究</th>
<th>混合方法研究</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. 你曾多少次和他人讨论过使用以下的研究方法？

<table>
<thead>
<tr>
<th>研究方法</th>
<th>质性研究</th>
<th>量化研究</th>
<th>混合方法研究</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

III. 您对混合方法的看法
问卷题目没有正确或错误的答案。所以请按照您自身的情况，指出您对问卷题目的赞成程度。
分值越高表明您的赞成度越高（1 非常不赞成 —7 非常赞成）。具体如下：

<table>
<thead>
<tr>
<th>题目</th>
<th>1 非常不赞成</th>
<th>2 不赞成</th>
<th>3 有些不赞成</th>
<th>4 不赞成也反对</th>
<th>5 有些赞成</th>
<th>6 赞成</th>
<th>7 非常赞成</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. 我很难解释为何使用混合方法对研究有帮助。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>12. 我很擅长分析质性（文字）数据。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>13. 我非常自信能设计出使用混合方法的研究。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>14. 想在我的学术领域里发表混合方法研究的文章几乎不可能。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>15. 使用混合方法的好处对我来说显而易见。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>16. 我很擅长分析量化（数字）数据。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>17. 我觉得使用混合方法十分符合我所喜欢的研究方式。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>18. 我预测我今后会使用混合方法。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>19. 对我来说，向他人陈述使用混合方法的过程和结果，并不难。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>20. 我喜欢使用混合方法。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>21. 我很自信能做质性（定性）研究。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>22. 我很自信能做量化（定量）研究。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>23. 在我的领域，做混合方法研究几乎不可能拿到科研基金。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>24. 总的来说，我认为混合方法很容易用。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>25. 如果没有合作者，我不可能使用混合方法做研究。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>26. 我相信我能很好地和他人交流使用混合方法的过程和结果。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>27. 使用混合方法能使我更快地完成研究的任务。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>28. 我相信使用混合方法能很容易地解决我的研究问题。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>29. 使用混合方法让我的研究变得简单。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>30. 我想要使用混合方法。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>序号</td>
<td>句子</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>31.</td>
<td>学会使用混合方法对我来说很简单。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32.</td>
<td>使用混合方法让我能更好地掌控我的研究过程。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33.</td>
<td>使用混合方法很符合我做科研的风格。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34.</td>
<td>在我的领域，使用混合方法并非一个好主意。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35.</td>
<td>对我而言，使用混合方法非常适合我现有的情况。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36.</td>
<td>我决定今后使用混合方法。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37.</td>
<td>使用混合方法很愉快。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38.</td>
<td>使用混合方法能提高我的工作/研究质量。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39.</td>
<td>我知道我的领域有人在使用混合方法。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40.</td>
<td>做混合方法研究十分费时。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41.</td>
<td>我完全有能力整合质性数据和量化数据。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42.</td>
<td>混合方法在我的学术领域并不常见。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43.</td>
<td>混合方法使工作变得更有意思。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44.</td>
<td>使用混合方法能提高我的工作/研究成效。</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>45.</td>
<td>使用混合方法能让我们对所研究的问题有一个更</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>全面的认识</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>46. 使用混合方法有助于解决很复杂的研究问题。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>47. 在一项研究中，同时使用量化和质性方法能让他们互补不足</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>48. 对我而言，混合方法的使用简单易懂。</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
</tbody>
</table>
Appendix E

Model of Adoption of Mixed Methods
Appendix F
The Flowchart of the Basic Procedures

Phase I - Design and Implement the Qualitative Strand:
- Research purpose: to explore Chinese scholars’ perceptions and use of mixed methods.
- Research approach: an instrumental case study
- Sample: three leading scholars who are using mixed methods, six published mixed methods studies, 36 mixed methods theses and dissertations, eighteen commentary papers and 22 documents about the use of mixed methods
- Data collection: literature search in databases, three individual interviews
- Data analysis: systematic literature review, open coding, case analysis

Phase II - Modify the Instrument Building on the Qualitative Results:
- Modify the existing instrument for the survey in the quantitative strand
- Two runs of judges’ sorting; a focus group discussion on the translation issues;
- Pilot study and revise the instrument accordingly
- Refine quantitative research questions and the mixed methods questions
- Determine participants and sampling strategies

Phase III - Design and Implement the Quantitative Strand:
- Research purpose: to examine Chinese scholars’ intentions of using mixed methods and the influential factors
- Research approach: survey
- Sample: 247 Chinese scholars from three randomly selected Chinese universities
- Data collection: paper-based survey
- Data analysis: (1) item analysis & factor analysis for psychometric properties of the modified instrument; (2) path analysis and structural equation modeling techniques to identify the influential factors & to finalize the model of the adoption of mixed methods.

Interpret the Connected Results:
- Summarize and interpret the qualitative results.
- Summarize and interpret the quantitative results.
- Discuss to what extent and in what ways the quantitative results generalize and test the qualitative results.
- Discuss the complete picture of the adoption of mixed methods in China through integrating the two sets of results.
- Discuss the instrument development using the exploratory design.
Appendix G
The Diagram of the Exploratory Design

Phase 1

Procedures:
- Typical case sampling
- Qualitative Case Study
- Individual interviews (N=3)
- Literature search (N=80)

Products:
- Case information
- Transcripts
- Documents

Phase 2

Procedures:
- Inductive coding in MAXQDA
- Thematic development
- Systematic literature review
- Multiple data triangulation

Products:
- Coded text
- Quotes, codes, themes
- Case description
- Tables

Phase 3

Procedures:
- Scale development based on the qualitative results
- Panel reviews
- Judge sorting
- A pilot study & item analysis

Products:
- The modified instrument
- Analysis of the psychometric properties of the instrument: construct validity, content validity, reliability

Phase 4

Procedures:
- N=247 Chinese scholars
- Survey with the instrument

Products:
- Numerical item scores
- Demographic information

Procedures:
- Item analysis & factor analysis to further
- Group comparison analysis
- Multiple regression analysis
- Model modification and test
- Model estimation

Products:
- Content evidence of validity
- Construct evidence of validity
- Reliability: Cronbach’s alpha
- Tables and figures
- Model fit indices and coefficients
- T-test results
- Multiple regression results

Interpretation

Procedures:
- Discussion and integration of qual. and quan. Results.
- Evidence for instrument reliability and validity
- Discussion on how the qualitative dimensions were generalized in quantitative

Products:
- Interpretation of the adoption of mixed methods in China.
- Instrument of Adoption of MM.
- Model of Adoption of MM.
- Values of using the exploratory design in developing new scales.
- Join display matrices
Appendix H

Recommendations for the Expansion of Mixed Methods

1) Disciplines need to train their researchers about the design and implementation of mixed methods, and demonstrate the literature about the use of mixed methods in their areas.

2) Senior researchers should help the next generation of researchers obtain the necessary skills of qualitative and quantitative approaches.

3) Teamwork and collaboration is necessary for researchers to conduct mixed methods research if the individual scholar does not have qualitative, quantitative, and mixed methods expertise.

4) To advance the use of mixed methods, one should fully understand and explicit the rationales of mixing, the techniques of integration, and the implementation procedures.

5) Multiple ways are suggested to those who want to improve the knowledge and skills of mixed methods, including courses, workshops, readings, international conferences, and international collaborations.

6) When one selects the readings of mixed methods, be sure to review the most recent literature, to examine the empirical mixed methods studies in the specific disciplines, and to read the authority books and journals about mixed methods, including the SAGE Handbooks of Mixed Methods, Journal of Mixed Methods Research, International Journal of Multiple Research Approaches, and the work from the well-known mixed methods researchers and methodologists, including John Creswell, Jennifer Greene, Donna Mertens, Janice Morese, Linda Niehaus, Tony Onwuegbuzie, Vicki Plano Clark, Abbas Tashakkori, Charles Teddlie, and et al.
Appendix I

Seven-big-step Process of Scale Construction Using Exploratory Design

1. The investigators should fully understand the rationales and procedure of using exploratory design for instrument development.

2. Conduct a rigorous qualitative study, such as case study, grounded theory, and etc.

3. Work with those who have psychometric expertise for instrument development and those who have advanced statistics skills for instrument validation.

4. In the instrument development process (also the first-stage of validation):
   01) Discuss what you want to measure.
   02) Write items based on the literature review and qualitative findings.
   03) Explicit about the conversion from qualitative findings to scales and items.
   04) Discuss why do you think the generated items and scales can measure what you want to measure, which involves a discussion of specifying the structure of the scales and a discussion of the construct validity.
   05) Determine the format of the item response and visual display.
   06) Have a panel of experts review the item pool to assess item quality to provide content evidence of validity (representativeness and completeness).
   07) Revised the items according to the panel’s feedback.
   08) Invite some other experts to sort the revised items to scales to collect construct evidence of validity.
   09) Interview a focus group about the translation adaptation if needed.
   10) Conduct a pilot study, and interview the participants for feedback.
   11) Analyze the items, including the internal reliability of Cronbach’s $\alpha$ (conventionally higher than .70), inter-item $r$ (conventionally higher than .50), scale variance (should be high), and corrected item-total correlations (should be positive and conventionally higher than .20/ .30).
   12) Determine, revise, and or delete the poor items according to the pilot study results.
   13) Conduct another pilot study, and repeat the above steps if necessary.
5. Administer the newly developed instrument in the follow-up quantitative study, such as survey.

6. In the second stage of instrument validation process (using the quantitative results):
7. Estimate the internal reliability (Cronbach’s $\alpha$ and inter-item $r$) of the scales because reliability is a necessary condition for validity.
8. Conduct confirmatory factor analysis to examine the specified factor structure of the instrument.
9. Examine multiple model fit indices (Chi-square, CFI, RMSEA, SRMR) to verify the structure of the instrument.
10. Estimate the standardized factor loadings (conventionally higher than .30/.40) to examine the relationships between items and its scale.
11. Estimate the convergent and discriminant validity of the scales (for the convergent validity evidence, check the item factor loadings, composite reliability, average variance extracted, inter-item correlations, and model fit; for the discriminant validity, check the model chi-square different test, factor correlations, and inter-item correlations).
12. Conduct a series of group invariance test to verify the instrument is unbiased.
13. Delete or revise the poor items according to the above statistics results.
14. Conduct another run of survey with the revised items.
15. Repeat the above steps until the new instrument with satisfactory psychometric properties.
16. Discuss the integration of qualitative and quantitative approaches in the study, and how the integration enhances the rigor of the instrument development and validation.
Appendix J

Instrument of Adoption of Mixed Methods

*Intentions to Use Mixed Methods (α= .81)*

1. I intend to use mixed methods in the future.
2. I predict I would use mixed methods in the future.
3. I plan to use mixed methods in the future.

*Contact with Qualitative/Quantitative/Mixed Methods (α= .80)*

1. How many courses did you take to learn about this methodology?
2. How many training occasions (including conferences, workshops, lectures, and seminars) did you attend to learn about this methodology?
3. How many studies did you participate in using this methodology?
4. How many times did you present this type of research (including publishing papers, presenting at conferences, and speaking at lectures)?
5. How many articles (including book chapters) did you read about this methodology?
6. How many times did you talk with others about using this methodology?

*Relative Advantage of Using Mixed Methods (α= .85)*

1. Using mixed methods enables me to accomplish tasks more quickly.
2. Using mixed methods makes it easier to do my job.
3. Using mixed methods gives me greater control over my research process.
4. Using mixed methods improves the quality of work I do.
5. Using mixed methods enhances my effectiveness on the job.
Compatibility of Using Mixed Methods ($\alpha = 0.80$)

1. I think that using mixed methods fits well with the way I like to work.
2. Using mixed methods is completely compatible with my current situation.
3. Using mixed methods fits into my work style.

Ease of Use of Mixed Methods ($\alpha = 0.73$)

1. Overall, I believe that mixed methods is easy to use.
2. Learning to use mixed methods is easy for me.
3. The use of mixed methods is clear and understandable to me.
4. I believe that it is easy to use mixed methods to get my research questions answered.

Reasons to Use Mixed Methods ($\alpha = 0.88$)

1. The weaknesses of one research method can be offset by the strengths of the other research method.
2. Using mixed methods can solve complex research problems.
3. Using mixed methods can provide a complete understanding of research problems.
Appendix K

Sample of Sorting Table for Judges

### Complexity

<table>
<thead>
<tr>
<th>Perceived Ease of Use/Simplicity</th>
<th>Original definition of the construct</th>
<th>Any suggestion on the label?</th>
<th>Your definition of this construct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity indicated “the degree to which mixed methods is perceived as relatively difficult to understand and use.”</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Items | How well does this item demonstrate the construct?  
1 = (very poor)  
10 = (excellent) | Suggestions |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Item #</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
## Appendix L

Sample of Translation Adaptation Table for Judges

<table>
<thead>
<tr>
<th>#</th>
<th>Chinese</th>
<th>English</th>
<th>Note</th>
<th>More</th>
<th>Good</th>
<th>Suggestion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>做项目经验使我明白使用混合方法的研究者可能遇到的困难。</td>
<td>I would have difficulty explaining why using mixed methods may or may not be beneficial to research.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>做项目经验使我明白使用混合方法的研究者可能遇到的困难。</td>
<td>I am good at analyzing qualitative data.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>做项目经验使我明白使用混合方法的研究者可能遇到的困难。</td>
<td>I am very confident in designing a mixed methods research project.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>做项目经验使我明白使用混合方法的研究者可能遇到的困难。</td>
<td>It is very unlikely to publish mixed methods research in my field.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>做项目经验使我明白使用混合方法的研究者可能遇到的困难。</td>
<td>How many training occasions (including conferences, workshops, lectures, and seminars) did you need to learn about this methodology?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>使用混合方法的好处让我印象深刻。</td>
<td>The benefits of using mixed methods are apparent to me.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>使用混合方法的好处让我印象深刻。</td>
<td>I am good at analyzing quantitative data.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>使用混合方法的好处让我印象深刻。</td>
<td>I think that using mixed methods fits well with the way I like to work/research.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>我对使用混合方法的项目非常有经验。</td>
<td>I would use mixed methods in the future.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>我对使用混合方法的项目非常有经验。</td>
<td>I would use mixed methods if they fit my research.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>我对使用混合方法的项目非常有经验。</td>
<td>I would have no difficulty telling others about the work of using mixed methods.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>我对使用混合方法的项目非常有经验。</td>
<td>I would be happy to use mixed methods.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>我对使用混合方法的项目非常有经验。</td>
<td>I would be happy to use mixed methods.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>我对使用混合方法的项目非常有经验。</td>
<td>I would be happy to use mixed methods.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>我对使用混合方法的项目非常有经验。</td>
<td>I am very confident in doing qualitative research.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>我对使用混合方法的项目非常有经验。</td>
<td>I am very confident in doing quantitative research.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>我对使用混合方法的项目非常有经验。</td>
<td>How many articles (including book chapters) did you need to learn about this methodology?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>我对使用混合方法的项目非常有经验。</td>
<td>I am very confident in doing quantitative research.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>我对使用混合方法的项目非常有经验。</td>
<td>It is impossible to get mixed methods project funded in my discipline.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>