7

How to Write Chapter Three, Methods

> The discipline of the writer is to learn to be still and listen to what his subject has to tell him.
>
> —Rachel Louise Carson

If you have successfully completed Chapter Two, Literature Review, of your master's thesis—well done! Feel free to take a short break and reward yourself for the hard work up to this point. Then roll up your sleeves, grab the coffee mug, and wipe the dust off the computer! This chapter will focus on how to write Chapter Three, Methods (also referred to as Methodology), of the research study and thesis. After sweating through Chapters One and Two, Chapter Three will probably be the most enjoyable to write because this is where you describe your research design and the procedures implemented in your study. In doing so, you will apply what you have learned in your research preparation and in the literature review. Chapter Three is very important because your chairperson and committee members will review this chapter carefully to determine if the research design is appropriate and identify areas that need to be improved.

Chapter Three, Methods, is a critical component of the master's thesis. In this chapter, you will describe in detail how you conducted your research study (i.e., the methodology that you employed). The Methods chapter describes and explains the research design: setting/sample, measurement instruments, procedures, and data analysis that were used to complete the study. The Methods chapter needs to be written with sufficient detail to provide a context for the results in Chapter Four and for replicability purposes. **Replicability** refers to the ability to replicate (i.e., copy) the study to verify and interpret the results or adapt and expand the study. Do not worry, replicability does not mean you have to redo your study, but others may want to. If you have selected a research problem that has wide interest, it is likely that someone will want to conduct a study in hopes of confirming or expanding your results. For this reason, you want to be certain that the full details of your design are sufficiently described so that someone can independently replicate your study as you conducted it. Since Chapter Three focuses on the methodology of *your* study, it will be based on what you have already done. Now, it is just a matter of writing it in a systematic and comprehensive way.

Preparation and Organization

There are several items that need to be prepared and organized before you begin to write. First, if you have not already done so, it is critical that you

prepare a "draft" or "proposal" of Chapter Three before you actually conduct the research. At a minimum, the proposal is a blueprint of the research design and should include the research site, participants, intervention/materials (if appropriate), measurement instruments that will be used to collect data, procedures, and a plan for data analysis. This should be very similar to the research proposal that you submitted as part of your application for the Institutional Review Board (IRB). During the proposal stage, your chairperson and committee members will typically want and need to be very much involved. In many ways, this is an opportunity for them to teach and for you to learn. If the design is not appropriate for the study, then your work in carrying out the study may not meet the requirements for an acceptable thesis. Sometimes, your chairperson may ask another colleague to assist you on some component of the research design such as the data analysis. Just make sure that Chapter Three's proposal is approved by your chairperson and you have IRB approval before you actually begin to collect data!

Chapter Three Sections

Once you have received approval from your chairperson and have organized all of your research materials, you can start to write Chapter Three. Chapter Three starts on a new page in the thesis. Chapter Three is divided into eight main sections: (a) *Introduction*, (b) *Setting*, (c) *Participants*, (d) *Intervention*, (e) *Materials*, (f) *Measurement Instruments*, (g) *Procedure*, and (h) *Data Analysis* (see Figure 7.1 for major sections in

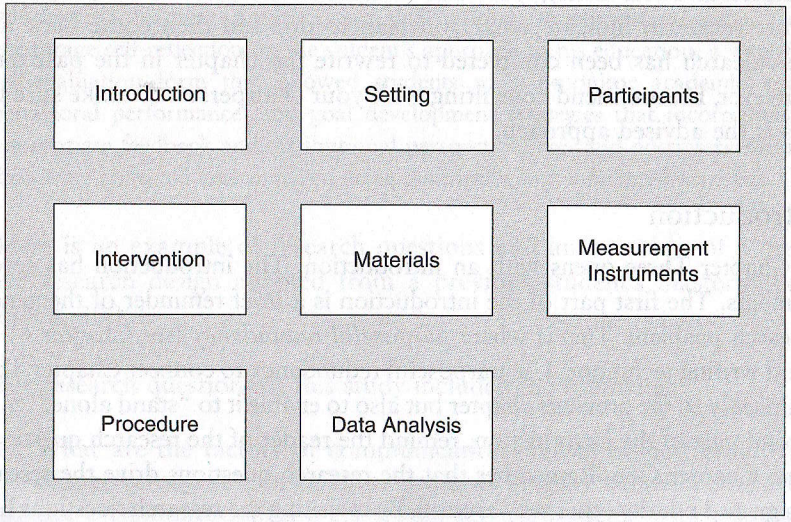

Figure 7.1. Major sections in Chapter Three, Methods.

Chapter Three). If you remember the research synthesis structure from the literature review, the sections in Chapter Three are very similar to a research article. Keep in mind that although they are written and discussed separately, the sections are intertwined and collectively they form the methods of the study.

Depending on your research design, some of the sections listed above may have different titles or may not apply to your thesis. For example, *Intervention* would only be applicable if you conducted an intervention (i.e., experiment) as part of your study. Thus, before you start writing, check with your chairperson for which sections to include. Writing Chapter Three can be enjoyable because it is similar to storytelling. You want to tell the reader the "story" of how you conducted your research study, so it should include a setting, characters, and main events (the conclusion of the story will be told in Chapters Four and Five). However, remember that the writing style must be technical in nature, and you must describe the critical elements of the research methods you employed. Consider that the broad audience (readers) may be experienced researchers and/or practitioners. Thus, they will expect to see the elements of your research described in a manner that is accurate but easily understood.

To guide you in writing Chapter Three, I will first discuss how to write each section in general. Then I will provide examples of written work adapted from former students' completed master's theses. I will include examples from both quantitative and qualitative studies when a distinction between the two approaches is necessary. You will notice that the examples are written in the past tense to indicate that the studies have already been completed. Most likely, you will write the Chapter Three proposal in future tense (to indicate what you plan to do) and then come back after the research has been completed to rewrite the chapter in the past tense. However, I recommend consulting with your chairperson to make sure that this is the advised approach.

Introduction

Chapter Three opens with an introduction. The introduction has several elements. The first part of the introduction is a brief reminder of the general research problem. This is where *purposeful redundancy* (see Chapter 6) is a good writing technique. Use purposeful redundancy to connect Chapter Three seamlessly to the previous chapter but also to enable it to "stand alone." In the second part of the introduction, remind the reader of the research question(s) from Chapter One. Remember that the research questions drive the research design and not the other way around. By revisiting the research questions here, you are providing a justification and bridge to the specific research design that

was used to answer the questions. Finally, the third part of the introduction is an overview of the research design that was used in the study and a brief explanation of how data were collected and analyzed.

Providing the reader with an overview of the research design is critical as it sets the tone (and layout of the sections) for the rest of the chapter. For example, if you used a quasi-experimental research design, the reader will expect to see large groups of participants, independent and dependent variables, and hypothesis testing. If you used a qualitative case study design, the reader will expect to see a small group of participants, description of observation forms or interview questions, and coding of narrative data.

Here is an example of research questions and an overview of a quantitative research design adapted from a former student's master's thesis (Williams, 2006):

> The following research questions were addressed in this study:
>
> 1. What are the effects of a self-directed learning program on the behavior of high school students with learning disabilities?
> 2. What are the effects of a self-directed learning program on the levels of self-determination for high school students with learning disabilities?
>
> This study followed a quantitative pre-experimental model, using a one-group pretest–posttest design. Self-directed learning strategies were embedded into the curriculum of the participating teacher's high school special education English classes. The effects of the self-directed learning program on students' behavior and self-determination levels were measured through a survey. The self-directed learning program included writing assignments designed to encourage self-reflection on the student's approach to his education, a weekly self-evaluation form that allowed students to self-monitor academic and behavioral performance, and goal development strategies that incorporated appropriate feedback and attributional perspective. Pre- and postintervention data were collected and analyzed using descriptive and inferential statistics.

Here is an example of research questions and an overview of a qualitative research design adapted from a previous student's master's thesis (Kendall, 2006):

> The research questions of this study included the following:
>
> 1. What are the factors of communication (verbal or nonverbal) that trigger behavioral outbursts or promote positive behavior and effective communication in a classroom serving students with emotional disturbances and learning disabilities?

2. What are the cultural differences in communication (verbal or nonverbal)?
3. What are the factors leading to positive student–teacher relationships?
4. What are the factors that promote a high degree of instructional efficacy?

This qualitative case study described the cultural views of high school teachers and staff and students with emotional disturbances and learning disabilities. Interviews and observations were used to collect data in teacher–student communication with the primary goal of revealing the relationship between positive and negative verbal or nonverbal communications and students' behavior. The narrative data were transcribed, coded, and categorized into four themes related to the research questions.

Setting

The second section in Chapter Three is the *Setting* (this is the first section that requires a level heading). In this section, describe the research site(s) where the research was conducted. Similar to the setting in a story, the setting in the thesis is where the study took place (i.e., data were collected). The setting could be in a number of locations such as a school, hospital, church, prison, office, home, or even on a bus. In writing about the setting, first provide a description of the broad setting (e.g., school, hospital, juvenile detention center, community center). Remember to include any background or historical information about the setting so that the reader can situate your research site in the broader context. In addition to the broad setting, include a description of the specific area(s) where the data were collected (e.g., classroom, a person's home, office). Include any demographic data related to the setting as appropriate.

Here is an example of a research setting adapted from a former student's master's thesis (Irey, 2008):

This study took place in an urban elementary school located in Northern California. Fifty-nine percent of students at the school qualified for free lunch, and almost 16% were English learners. Thirty percent of students were Hispanic or Latino; 28% were African American, not Hispanic; 17% were White, not Hispanic; 9% were Asian; 3% were Filipino; 2% were American Indian; less than 1% were Pacific Islander; and 11% declined to state or claimed multiple ethnicities.

The intervention was conducted on a pullout, individual basis. Instruction was provided in the resource room at the participants' elementary school during the regular school day. The resource room is a small classroom containing a kidney table with a half-sized chalkboard posted at the front wall. There is also a long rectangular table in the back of the room, which is where students received the intervention.

Participants

The third section is the *Participants*. There are two parts to this section. The first part describes the sampling plan that was used in the study. **Sampling** refers to the process of selecting participants for a study (Gay et al., 2012). In this part, explain how the participants were selected from the broader population.

The sampling plan will vary depending on the research question and design of the study. For example, if you are using a quantitative research design, select a large, representative sample group from the specified population. Again, depending on the research question and design, you may need to have a random sample. In a **random sample**, every individual in the population has an equal and independent chance of being selected (i.e., drawing names from a hat).

Be careful not to confuse random selection with random assignment. Random selection refers to selecting participants from the population. Random assignment refers to how the participants are put into groups. In **random assignment**, each participant in the sample has an equal and independent chance of being selected for the treatment group. If you are conducting a true experimental study, participants are randomly assigned into different treatment groups. This helps to eliminate the potential bias of having one group (e.g., experimental group) be "stronger" than the other and helps to level the playing field before the intervention begins.

Since it is not always possible or necessary to randomly select from the population, a nonrandom sample is more commonly used in a master's thesis. One example of a nonrandom sample is a convenience sample. In a **convenience sample**, the researcher selects the individuals who are available and accessible at the time. An example of a convenience sample is a teacher who includes all the students in her classroom. People with clipboards at the shopping mall (the ones that you avoid eye contact with and run away from) are also using a convenience sample when they select shoppers at the mall.

Another type of nonrandom sample is a purposive sample. In a **purposive sample**, the researcher selects individuals who are considered representative because they meet certain criteria for the study. For example, some important criteria for selection are whether the participant is willing and able to contribute to the understanding of the research problem, issue, or phenomenon being explored. In some cases, a specific site might be selected for the sample (Creswell, 2009). This is very common in qualitative studies.

Here is an example of a nonrandom sample from a qualitative study (Kendall, 2006):

> The sampling procedure used by the researcher was convenience sampling. The participants were restricted to those at the researcher's school site who attended or worked at the high school and the participant's willingness to partake in the study. Participants included 12 high-school students, one teacher, two paraeducators, and one therapist who worked at a public high school in Northern California. The participants were also selected because they were from diverse cultural backgrounds and part of the same classroom environment where they had multiple opportunities to display and observe communicative behaviors [the focus of the study].

The next part of the *Participants* section is the description of the participants. In this section, include the participants' demographic data such as age, gender, grade level, race/ethnicity, language, disability, socioeconomic status, occupation, years of experience, and so on. There are several reasons why the reader needs to have demographic information about the individuals who were involved in the study. First, if a researcher wants to replicate the study with the same type of participants, he needs to select participants who are comparable to yours. Similarly, if a researcher wants to replicate the study with a slightly different type of participant (e.g., age group), she would also need to know exactly who was included in your study in order to make modifications. Another reason for describing the participants is for generalizability purposes. **Generalizability** refers to the extent to which the results about a sample group from a study are applicable to the larger population. This is especially important in quantitative studies. By having a greater understanding of the sample group, the reader can make interpretations about whether or not the results apply to the larger population (assuming that the sample group is representative of the larger population). In qualitative studies, having a detailed description of the participants lends credibility to the researcher (and the findings) and helps the reader understand the phenomenon or issue that was explored. Since there is typically a smaller sample size in a qualitative study, each individual's contribution is heavily weighted in terms of shedding light on the research problem(s). Usually there is a table of participants' demographic data included as part of the thesis (see Chapter 10 for APA style).

Here is an example of the description of participants (Kendall, 2006):

> The participants in the study were from diverse ethnic backgrounds. There were 12 high school students. Eight students were African American; five were males, and three were females. Of the five African American males, there was one ninth-grade student, two 10th-grade students, one 11th-grade student, and one 12th-grade student. Of the three African American females, one was a 10th-grade student, and two were 12th-grade students. The three Latino students were all males and in the 11th grade. The one Caucasian male student was in the 11th grade. All of the students were enrolled in the special day class and were previously diagnosed with emotional disturbance (ED) or learning disability (LD). The participating teacher and therapist were Caucasian; the teacher was from the United States, and the therapist was originally from England. They were both in their mid-fifties and had over 10 years of professional experience. The two male paraeducators were African American and Latino, respectively.

Intervention and Materials

The fourth and fifth sections are the *Intervention* and *Materials* (if appropriate). In these sections, describe the intervention and instructional materials that were used in the study and how they were developed. These sections are necessary only if you included some sort of intervention (i.e., experiment) in a quantitative study. In writing about the intervention, you should describe both the independent and dependent variables. Remember that the independent variable is the cause or treatment that is expected to influence the dependent variable (i.e., the outcome or effect). For example, pretend a researcher implemented an algebra intervention with middle school students to prepare them for a statewide assessment. In this study, the algebra intervention is the independent variable and the dependent variable is the students' scores on the statewide assessment.

In a different study with two groups, a researcher compared the effectiveness of motivational interviewing (Spader, 2008) versus traditional nutritional counseling on the eating behaviors of patients with diabetes. In this study, the independent variable was the type of counseling treatment received, and the two levels (e.g., groups) of the independent variable were motivational interviewing and the traditional nutritional counseling. The dependent variable was the eating behaviors of the patients. When describing the intervention, the researcher would include a detailed description of *what* motivational interviewing and traditional nutritional counseling consisted of (the components) and how the two treatments differed.

Here is an example of an intervention adapted from a former student's master's thesis (Kornhauser, 2006):

> The independent variable measured by this study consisted of the intervention program: self-awareness training, social skills training, and increased transition planning involvement. The component of self-awareness training was intended to increase students' understanding and awareness of

their specific disabilities, including knowledge of their individual strengths and weaknesses, and ways in which they could compensate for their disabilities. Social skills training involved the examination of conflicts frequently encountered by students and the development of alternative, positive solutions to these conflicts through direct skill instruction. Lastly, interventions in the area of transition planning required students to participate in activities that would prepare them for a smooth transition into adult life after high school.

The dependent variable consisted of students' perception of their own levels of resiliency, as defined by the researcher. Within the dependent variable there were three categories of student perceptions: self-awareness, social skills, and transition planning.

In the *Materials* section, describe the materials that were used as part of the intervention. Sometimes these materials are from a commercial program and sometimes they are developed by the researcher. Remember to describe the materials in enough detail so that the reader could replicate or adapt the intervention. A good idea is to include a sample of the materials in the appendix of the thesis, so be sure to keep records and clean copies of everything that you used (see Chapter 10 for APA style).

Here is an example of a description of materials (Kornhauser, 2006):

Three main types of instructional materials were used during the intervention for self-awareness, social skills, and transition planning. Instructional materials to improve students' levels of self-awareness were developed by the researcher. These lessons focused on the study and understanding of students' disabilities, including strengths and weaknesses presented by the disabilities, and ways in which they could compensate for their weaknesses. In addition, students watched a video and used Internet resources to help them understand and gain insight into their disabilities.

Curriculum used in the social skill development lessons was taken from *Skillstreaming the Adolescent* (Goldstein & McGinnis, 1997). Lessons in this area consisted of activities in which students were required to examine their behaviors in situations involving conflict and discover positive ways in which they could approach these situations. Social skills instruction during these lessons involved components of modeling, discussion, role-play, and feedback.

The transition planning series of lessons was developed by the researcher and drawn from the transition planning curriculum mandated by the school district for all students receiving special education services. The curriculum involved direct instruction that focused on services available to individuals and use of the Internet as a tool to gather information. The curriculum also focused on career planning and independent living after graduation from high school (see Appendix B for sample lessons and materials).

Measurement Instruments

The sixth section is the *Measurement Instruments*. In this section, describe each of the measurement instruments or tools that were used to collect data. There should be a title and brief description of each measurement instrument and how the instrument was scored or interpreted. You can decide the order of presentation of the measurement instruments, although I typically discuss the most important instruments first. The presentation of the measurement instrument in Chapter Three represents a ladder, and each rung represents one measurement instrument (see Figure 7.2 for a depiction of the ladder for Chapter Three). Keep in mind that you will keep the same order for Chapters Four and Five. To represent this visually, I use the three parallel ladders strategy to represent the order of the measurement instruments across the three chapters (see Figure 7.3 for a depiction of the three parallel ladders strategy for Chapters Three, Four, and Five). The actual measurement instruments will be included in the appendix of the

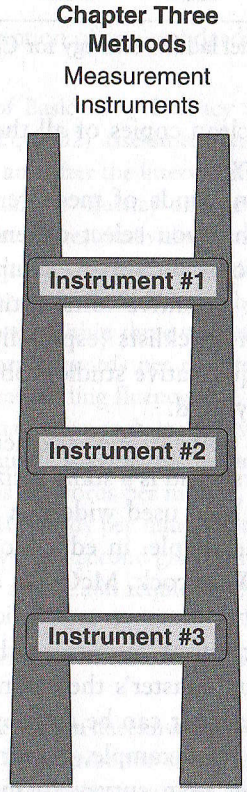

Figure 7.2. Ladder for Chapter Three.

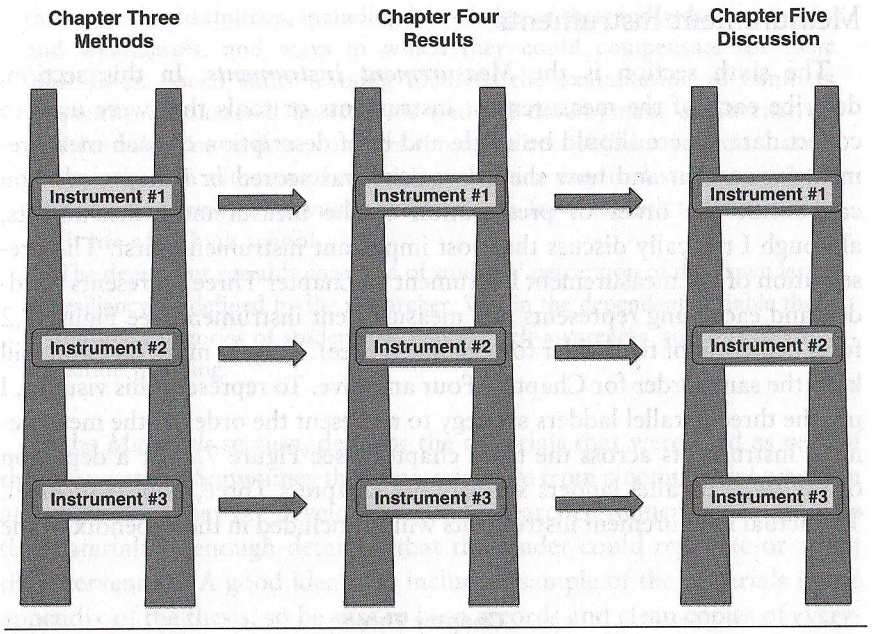

Figure 7.3. The three parallel ladders strategy for Chapters Three, Four, and Five.

thesis, so be sure to keep clean copies of all the instruments that you use (see Chapter 10 for APA style).

There are many different kinds of measurement instruments that can be used, and the one(s) that you select depends on the research design and research question in your study. For example, in quantitative studies, researchers commonly use cognitive tests, attitude scales (e.g., surveys), and structured observation checklists (especially for studies that measure changes in behaviors). In qualitative studies, observations, interviews, and focus groups are commonly used.

There are at least three kinds of measurement instruments that can be used to collect data. The first kind is a standardized instrument. This would be an instrument that has been used widely in the field and validated for a particular purpose. For example, in education, the Woodcock Johnson III Tests of Achievement (Woodcock, McGrew, & Mather, 2000) is a standardized battery of tests that measure academic achievement. The second kind of measurement instrument is a researcher-made instrument. This is very common in students' master's theses and sometimes preferable to standardized measures because it can be developed to be more "sensitive" to what is being studied. For example, a marriage and family therapist might want to develop her own survey to measure clients' satisfaction around a new communication technique she developed for family members.

The third kind of measurement instrument is collecting data that are normally collected or already exist. This is also helpful for students' master's theses because it saves time and resources since the data are already being collected for other purposes. For example, in business and management, companies often keep records of employee absences. A researcher might want to explore the relationship between the frequency of employee absences and their level of personal productivity.

In describing the measurement instruments, provide enough information so that the reader is able to replicate the study or interpret the results. For a quantitative measure such as a test or survey, this includes a title and a description of what the instrument measures, how it is administered, how many items and format of items, sample items, how it is scored, and any standardized benchmarks or norms. For a qualitative measure such as an observation or interview protocol, include a description of what it measures, how it is administered, type and number of questions asked, and sample items. Sample measurement instruments are typically included in the appendix of the thesis, so be sure to keep clean copies (see Chapter 10 for APA style).

Here is an example description of one standardized test measure (Irey, 2008):

> The Dynamic Indicators of Basic Early Literacy Skills Oral Reading Fluency (DORF; Good & Kaminski, 2002) assessment was used to measure students' fluency scores both before and after the intervention. The DORF is a standardized test that measures students' fluency and accuracy with leveled reading material. Students are given the test individually, and they read three passages aloud for one minute each. During this time, the administrator marks any omissions, substitutions, or hesitations (longer than three seconds) as errors. Self-corrections that are made within three seconds are not counted as errors. The median number of correct words per minute read on all three passages constitutes the student's oral reading fluency rate.
>
> The DORF has benchmarks for each grade level. The benchmark goal for students in spring of first grade is 40 words per minute, the goal for students in spring of second grade is 90 words per minute, and the goal for students in spring of third grade is 110 words per minute. Students scoring below 10 in spring of first grade, below 50 in second grade, and below 70 in the spring of third grade are considered at-risk and require intensive instruction.

Here is an example description of an observation checklist (Kendall, 2006):

> The researcher used an observation checklist to collect data. The purpose of the observation checklist was to describe the students', therapist's, teacher's, and paraeducators' communicative behaviors. The observations were conducted at five different times for an hour and a half for each observation, totaling

7.5 hours of observation. The behaviors observed for the school staff were yelling, frowning, smiling, laughter, physical contact, close proximity to student, medium proximity to student, long-range proximity, fat words, muscle words, negative comments, positive comments, rejection to requests, positive ultimatums, negative ultimatums, negative consequences, positive consequences, directives with no choice, and directives with a choice. The behaviors observed in the students were yelling, frowning, smiling, laughter, physical contact, close proximity to staff, medium proximity to staff, long-range proximity to staff, fat words (i.e., directives that are low in contextual cues), muscle words (i.e., directives that are high in contextual cues), negative comments, positive comments, posturing, horse play, or physical violence. Physical contact, rejection to requests, posturing, horse play, and physical violence all required a detailed description, including antecedent and subsequent behaviors, to describe the effect and nature of the behaviors (including verbal/nonverbal, voice tone, laughter, frowning, etc.). The communicative behaviors were tallied to produce a frequency count of each type of behavior. In addition, descriptive and reflective comments with regards to the communicative behaviors were noted on the observation checklist.

Validity and reliability. The last part of this section is a description of the measurement instrument's validity and reliability. **Validity** refers to the extent to which the instrument measures what it was intended to measure. If a measurement instrument is not valid for the intended purpose, then it will be difficult to interpret the results in a meaningful way. A standardized achievement test such as the Woodcock Johnson III is a good example of a measure that has strong validity data. Just be sure to follow the standardized procedures for administration and scoring, as straying from these procedures will decrease the validity of the results. If you create your own measurement instrument, two ways to increase the validity is to "pilot" it with a small group or have "experts" in the field review it and make any necessary adjustments.

Reliability refers to the extent to which an instrument consistently measures what it was intended to measure. If the measure (or individual scoring the measure) has strong reliability, then you should get similar results every time it is administered. Reliability is very important when using two alternate forms of a test or when the scoring or interpretation of the measure is subjective (e.g., coding observations or open-ended questions). If you have two or more people scoring or coding the measures, it is especially critical to have a rubric and do some interrater reliability training beforehand to increase reliability. Keep in mind that a valid measure is always reliable but a reliable measure is not always valid. In other words, you could consistently be measuring the wrong thing over and over. In writing about the validity and reliability of a measurement instrument, be sure to describe how you considered these two issues and amended the instruments if necessary.

Here is an example description of the validity and reliability of some measurement instruments (Irey, 2008):

> The validity and reliability of the DORF and the McLeod Assessment of Reading Comprehension assessments have previously been established (Good & Kaminski, 2002; McLeod, 1999), and each measure has been tested to ensure that the passages are correctly leveled to each grade level. To establish validity with the prosody checklist, it was used prior to the intervention with students at different reading levels to ensure that it measured all of the aspects it was intended to measure and was appropriate for all reading levels. To check its reliability, it was administered multiple times with the same students during a short period of time (so their skill level did not change) and modified as needed until it yielded similar scores on multiple trials. The same procedures were completed with the attitude survey.

Here is an example description of interrater reliability procedures adapted from a former student's master's thesis (Gomes, 2008):

> Another teacher from the researcher's school was enlisted to grade 25% of the reading comprehension tests to ensure interrater reliability. The teacher was chosen because he had read all of the graphic novels used in the study, had taught each of the students, and had a good relationship with the researcher. The teacher was given one test from each group for each phase, totaling eight tests, which were chosen at random by the researcher. He was blind to the conditions of the study. The teacher was instructed by the researcher to use the rubric to grade each test. The researcher trained him to use the rubric by providing him with a sample test and guiding him in using the rubric to answer each question. He was also instructed to mark items as correct when the participants' answers contained synonyms to the rubric answers. Moreover, he was shown by the researcher where and how to mark the scores of each test. Interrater reliability was established using a point-by-point analysis. The teacher scored eight reading comprehension assessments using a rubric given to him by the researcher. The researcher compared her scores of the same eight assessments to the scores of the teacher. For each question the researcher and the teacher matched, a percentage point was awarded. A percentage of agreement was assigned to each assessment.

Procedure

The seventh section is the *Procedure*. In this section, describe the data collection or procedures used to conduct the study. In other words, explain *how* the data were collected and the procedures that were followed throughout the study. This includes procedures for administering measurement instruments, details of implementation for any intervention

(e.g., length of treatment, time of day), and difference of conditions in treatment groups (if there were multiple groups). As mentioned, there are many different ways to collect data depending on the research design and research question. However, detailed descriptions in this section are extremely important for both credibility and replicability purposes.

For a qualitative study, data collection could involve conducting observations, interviews, focus groups, or researching documents, artifacts, and audiovisual materials (Creswell, 2012). In writing this section, you need to explain exactly *how* these data collection activities were conducted. For example, if you conducted observations, describe the conditions in which you conducted the observations (e.g., time, place, frequency), your role as the observer (e.g., participant or nonparticipant observer), and how field notes were recorded.

Here is a description of data collection from a qualitative study (Kendall, 2006):

> The data were collected through observations and interviews. The observations were collected under natural, non-manipulative settings using an observation checklist (see Appendix B). The observations of the participants were conducted in their classroom which was the natural setting. The researcher was a nonparticipant observer and sat in the back of the room to avoid any interference to the setting. The data collection process took place over a five-week time period. Observations took place once per week for a one and a half hour time period, totaling five observations (7.5 hours of observation time). The interviews were conducted at the school site, and the procedure did not disrupt the participants' normal, daily, classroom activities. The interviews were conducted with the participants individually during their lunch or preparation period in a different classroom, using the interview protocol (see Appendix B). Each interview was tape-recorded for accuracy and lasted between 30 and 45 minutes.

To describe the data collection procedures in a quantitative study, it is easiest to describe each phase of the study. For example, in an experimental study, you could divide the procedures into three phases using the following subheadings: pretest, intervention, and posttest. In the pretest phase (also referred to as baseline), describe any procedures that were implemented prior to the intervention. This includes any measurement instruments that were administered as a pretest or preintervention actions such as meeting with the participants or training service providers.

Here is an example of the pretest phase adapted from a former student's master's thesis (Nixon, 2004):

> Each of the measurement instruments was administered to students two weeks prior to the intervention. The two reading comprehension measures were administered individually. The student was given a story to read silently (see Appendix B). Before the student read, the researcher prompted, "Please read this story carefully to yourself. As you read try to remember as much as you can. When you are done, I will ask you to retell the story back to me in your own words. I will also ask you some questions about the story." After the student read the story silently, he was prompted, "Now, please tell the story back to me in your own words." The student's retelling was tape-recorded, then transcribed, and used to score the story retelling checklist. At the conclusion of the retelling, the student was then prompted, "Now I am going to ask you some questions about the story." The researcher completed the story grammar checklist as the student responded to the questions. All responses were also tape-recorded in case they needed to be reviewed by the researcher later.
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> The motivation survey was administered to the students as a whole group. Before each administration, the students were prompted, "This is a survey about reading. Each question will tell you the way some people feel about reading. Under each question are five statements . . . a lot like me, a little like me, not sure, a little different from me, and very different from me. Fill in the bubble that shows how you feel about the question. Stop and think about each question before you answer. You will have as much time as you need to finish all of the questions. This is not a test and does not count toward your grade. Please take each question seriously and answer it as honestly as you can." At the completion of the administration, surveys were collected and scored by the researcher.

In the intervention phase, describe any procedures that were implemented during the intervention. This includes the frequency and duration, the stages of the intervention, and any measurement instruments that were administered.

Here is an example of a description from one unit of instruction during the intervention phase (Nixon, 2004):

> The intervention occurred during the students' Resource Reading/Academic Support class (50-minute sessions) four times per week over the course of six weeks. The intervention consisted of three units designed to incorporate a specific dramatic element into reading instruction. Unit One focused on script writing, Unit Two focused on the use of props, and Unit Three focused on role-playing. The stories used in each unit were taken from the class textbook adopted by the district for all reading classes and were written at the students' instructional reading level.
>
> The general procedures for each unit were very similar. On Day One, students read the story independently and wrote written responses to a series of comprehension questions provided by the textbook. On Day Two, the teacher read the story aloud as the class followed along. The responses to

the questions written the previous day were then discussed. Then the teacher reviewed all group rules, roles, and procedures with the class (these were posted on the classroom wall) (see Appendix B) and announced the members of each group which were selected by the teacher. Group members changed for each unit. The teacher also introduced the rubric and guidelines for the group project. The rubric was used by the researcher to evaluate student learning.

On Day Three, students sat in their designated groups and completed a story outline, including the introduction, rising actions, climax, and conclusion for the story (see Appendix C). They also began working on the tasks specific to the unit objective. On Day Four and Day Five, they continued to work in groups. On Day Six, the groups rehearsed their performances. On Day Seven, the groups presented their projects to the class and their performances were videotaped. On Day Eight, the class viewed the footage from the performances and received their project grades based on the rubric and guidelines established on Day Two. Each student received an individual grade and a group grade for each unit project.

In the posttest phase, describe any procedures that were implemented after the intervention. This includes any measurement instruments that were administered as a posttest or postintervention actions such as a follow-up meeting with the participants. These procedures can be similar to the pretest phase, although sometimes researchers may implement additional measures that were not given during the pretest phase.

Here is an example of the description of the posttest phase (Nixon, 2004):

> Each of the measurement instruments was administered two weeks after the completion of the intervention. On the reading comprehension measures, students were asked to independently read a different story than the one used on the pretest but at the same reading level (see Appendix C). Posttest administration procedures for all these measurements were the same as those used for the pretest.

Data Analysis

The eighth section is the *Data Analysis*. In this section, describe the procedures that were used to analyze the data from the study. The methods used to analyze the data depend on the research design, research questions, methods of data collection, and the type of data that were collected. Just as there are numerous ways to collect data, there are also many different ways to analyze data. One suggestion that I give students is to analyze the data so that they can answer the research questions! For

example, if one of the research questions asks whether the participants changed their behavior before and after the study, then one of the procedures for data analysis needs to be a comparison of the pre- and postdata. If the research question asks about the participants' understanding of a situation, then the data analysis should involve descriptions from interviews or observations.

In qualitative studies where the data are mostly narrative, data analysis typically involves a categorizing strategy through coding (Maxwell, 2013). Coding allows you to label and group the data into meaningful chunks. "Coding categories are a means of sorting the descriptive data you have collected . . . so that the material bearing on a given topic can be physically separated from other data" (Bogdan & Biklen, 2003, p. 161). This is necessary to interpret the data and draw out the major themes. A simple analogy would be sorting a pile of clothing to launder by color (lights or darks) or by temperature (hot or cold water). Throughout the data analysis process, qualitative researchers also write memos to themselves, keep reflective journals, and audio record their thoughts on an on-going basis. I will discuss this in more detail in Chapter 8.

Here is an example of data analysis adapted from a former student's master's thesis (Stephens, 2006):

> The collected data were transcribed and categorized in terms of research questions and emergent themes. Specific interview questions were matched to answer the five research questions. A coding method was used to organize interview data into a limited number of themes and issues around these questions. Quotations were then selected from the interviews that illuminated the themes and concepts. Specific survey questions were also matched to specific research study questions. Data from the survey were also compared with the data from the interview to see if they were in corroboration.

In quantitative studies where the data are numerical, data analysis typically involves either descriptive or inferential statistics. This includes identifying the indices that will be used to describe the data (e.g., mean, standard deviation) or any statistical tests (e.g., *t* test). In single subject design studies, the data can be analyzed by visually inspecting the graphed data. I will discuss quantitative data analysis in more detail in Chapter 8.

Here is an example of quantitative data analysis (Gomes, 2008):

> Two methods of quantitative data analysis were used in this study. The results of the reading comprehension tests were analyzed using descriptive statistics and inferential statistics. The participants' reading comprehension tests were divided into two subgroups for data analysis purposes: Group 1 was the

students' mean test score after having read a graphic novel with illustrations, and Group 2 was the students' mean test score after having read a text-version of the stories. Statistical analysis using Statistical Package for the Social Sciences (SPSS) software was conducted on these two subgroups to identify the range, mean, and standard deviation for each group. An independent samples *t* test was then conducted to compare the mean scores and to identify if there was a significant difference between the two subgroups' mean scores.

The results from the reading motivation survey were analyzed descriptively. The use of zoomerang.com enabled the researcher to immediately view compiled results from the reading motivation survey. The results were reported in three ways: actual number of respondents, the percentages, and as bar graphs. The results were reviewed item-by-item by the researcher. The results could not be looked at by individual participants since zoomerang.com compiled all of the responses together as a group. Therefore, the researcher had to analyze the results by looking at the total number of responses to each individual question on the presurvey and comparing them to the total number of responses to each individual question on the postsurvey.

Although you are reporting the results in Chapter Four, it is important to describe the data analysis procedures in enough detail in Chapter Three so that the reported results will be meaningful. This means ensuring that for every data set collected, there is a description of how the data were analyzed. Many students struggle with this section because of their lack of familiarity with statistics or qualitative data analysis. If this is the case, your chairperson and committee members may offer recommendations; referring to a research methods textbook can also be extremely helpful. There are some textbooks listed in the *Resources*.

Summary

Chapter Three is a critical chapter in the thesis because it explains the methods that were used in conducting your study. Chapter Three is also one of the more enjoyable chapters to write because you are telling the story of how you conducted your research. However, the essential aspect of writing this chapter is to be as detailed and comprehensive in your descriptions as possible. In doing so, you build credibility for your study by giving the reader the opportunity to verify, interpret, or replicate the study. In addition, you lay the groundwork for the focus of the next two chapters in which you will report and interpret your findings. In the next chapter, I will discuss how to write Chapter Four, Results, for your thesis. Here is a summary of the most critical points from Chapter 7:

- The Methods chapter describes and explains the research design such as the setting, participants, measurement instruments, procedures, and data analysis that were used to complete the study.
- The Methods chapter needs to be written with sufficient detail to provide a context for the results and for replicability purposes.
- While conducting the study, keep a log or journal of the dates and times that you collected data, materials or lessons that were used, individuals that you met with, and any problems, surprises, or changes that occurred throughout the study.
- The main sections are (a) *Introduction*, (b) *Setting*, (c) *Participants*, (d) *Intervention*, (e) *Materials*, (f) *Measurement Instruments*, (g) *Procedure*, and (h) *Data Analysis*.
- You can have a random or nonrandom sample depending on the research design, questions, and accessibility of participants.
- In writing about the intervention, you should describe the independent and dependent variables.
- There are at least three kinds of measurement instruments that can be used to collect data: (a) standardized instrument, (b) researcher-made instrument, and (c) data that are normally collected or already exist.
- The measurement instruments should be valid and reliable.
- Data collection/procedures includes how the measurement instruments were administered, details of implementation for any intervention (e.g., length of treatment, time of day), and difference of conditions in treatment groups (if any).
- One way to analyze data is to organize the analysis around the research questions.

Resources

Common Obstacles and Practical Solutions

1. A common obstacle that students face in writing Chapter Three is failing to keep adequate records about their study. Words that come to mind are, "I can't remember everything I did!" Since it is very likely that you will need to go back to update and revise Chapter Three after the research has been conducted, it is important to keep track of all the research activities. When conducting the study, keep a log or journal of the research activities throughout the study. There is no set structure or format for the log, but you should write down information about the actual procedures that you used (especially details that you might forget about later). For example, write down the dates and times that you collected data, materials or lessons that were used, individuals whom you met with, and any problems, surprises, or changes that occurred. This will help to ensure that you are implementing the

research design and methods as you described in Chapter Three. Put dates and times on all field notes, observations, and transcripts. This will make the process of data analysis and writing Chapter Three more efficient and less frustrating. In addition to keeping a log, make sure to collect detailed information about the research site and the participants (e.g., demographic data). This will keep you from having to go back to the research site to retrieve this information. Remember to keep all collected data in labeled folders and in a safe place away from the research site (e.g., locked file cabinet in your home). You have confidential and personal information related to your participants, so you need to protect the data as much as possible. Finally, keep *printed* copies of any instructional materials, lessons, measurement instruments, audiovisual materials, field notes, and transcripts since you will need to refer back to them. In other words, do not throw any data away, ever, and always **back . . . up . . . your . . . work**. In this day and age where computers are prone to viruses and hard drives crash on a whim, you do not want your master's thesis to be the victim of a "fatal system error" (also known as the "Blue Screen of Death").

2. Another common obstacle faced by students is data overload. Often students will enjoy the data collection process (especially when interacting with participants), but when the study is over, they end up with piles and piles of data. Words that come to mind are, "What am I going to do with all these data?" When conducting research, more data are not always better. What is most important is that you collect enough accurate data to answer the research questions. In fact, having an overabundance of data may diffuse your research, especially when the data are not related to the research problem or questions. One way to reduce this problem is to align the measurement instruments with the research questions from the very beginning. For example, if you are using an interview protocol, try to identify which items for the interview will help you answer specific research questions (of course, you will always have initial buffer questions to build rapport that may not be related to the research questions). If you are using tests or surveys, make sure the items capture the essence of what is being asked in the research question.

Reflection/Discussion Questions

Before you conduct your study, it is important to identify the measurement instruments for data collection. Then, to write Chapter Three, you need to be able to "report" how the data were collected for replicability purposes. The following reflection/discussion questions will help guide you through these two processes.

1. What are the different kinds of measurement instruments that can be used to collect data? Give examples of measurement instruments that would be appropriate for quantitative or qualitative research designs. Then, pick a specific measurement instrument and discuss how you could use it in your study to collect data and how to make it valid and reliable.
2. Why is replicability important in research? Give examples of what information is critical to include in Chapter Three so that another researcher could replicate your study.

Try It Exercises

The following exercises are designed to help you write Chapter Three. In Activity One, you will outline the major sections of Chapter Three and begin to flesh out the components. In Activity Two, you will develop or find a measurement instrument that you could use for data collection.

1. Activity One: For this activity, focus on your research proposal.
   - Based on your research design, create an outline of the major sections that you will include in Chapter Three (e.g., setting, sample).
   - For each section, write at least three bullet points (they do not have to be complete sentences) about what you will include in the section (or information that you need to retrieve). For example, what is your sampling plan? Who will be the participants in your study? What measurement instruments will you use? How will you collect data?

2. Activity Two: For this activity, focus on one measurement instrument that you will use to collect data.
   - Develop or find a measurement instrument that you will use to collect data for your study.
   - If you want to use a survey, develop or find a self-administered instrument that you can give or send to a group of people to measure attitudes, perceptions, behavior, and so on.
   - If you want to conduct an interview, create a list of questions to ask the research participant.
   - If you want to do structured observations, create an observation checklist that you would use to observe, assess, tally, or otherwise document an event in a natural setting (e.g., behavior).
   - If you want to use a cognitive test, create or find a written test that you would use to assess knowledge or skills in a subject area related to your research problem.
   - Discuss the issues related to the measurement instrument's validity and reliability with your chairperson.

Key Terms

- convenience sample
- generalizability
- purposive sample
- random assignment
- random sample
- reliability
- replicability
- sampling
- validity

Suggested Readings

- Babbie, E. (2007). *The practice of social research* (11th ed.). Belmont, CA: Thompson.
- Creswell, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: Sage.
- Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (4th ed.). Boston: Pearson Education.
- Creswell, J. W. (2013). *Qualitative inquiry and research design* (3rd ed.). Thousand Oaks, CA: Sage.
- Delice, A. (2010). The sampling issues in quantitative research. *Educational Sciences: Theory & Practice, 10*(4), 2001–2018.
- Law, M., Stewart, D., Letts, L., Pollock, N., Bosch, J., & Westmorland, M. (1998). *Guidelines for critical review form: Qualitative studies*. Available online: http://www-fhs.mcmaster.ca/rehab/ebp/pdf/qualguidelines.pdf
- Leech, N. L., & Onwuegbuzie, A. J. (2007). Sampling designs in qualitative research: Making the sampling process more public. *The Qualitative Report, 12*(2), 238–254
- Leech, N. L., & Onwuegbuzie, A. J. (2010). Guidelines for conducting and reporting mixed research in the field of counseling and beyond. *Journal of Counseling and Development, 88*(1), 61–69.
- Maxwell, J. A. (2013). *Qualitative research design: An interactive approach*. Thousand Oaks, CA: Sage.
- McCotter, S. S. (2001, June). The journey of a beginning researcher. *The Qualitative Report, 6*(2). Available online: http://www.nova.edu/ssss/QR/QR6-2 /mccotter.html

Web Links

- Basic Business Research Methods http://managementhelp.org/businessresearch /index.htm
- Qual Page: Resources for Qualitative Research http://www.qualitativeresearch .uga.edu/QualPage/
- Social Research Methods http://www.socialresearchmethods.net/

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How to Write Chapter Four, Results

(Continued)