

# METHODS OF ANALYZING DATA

This chapter describes data analysis. Analysis means to break something down into its component parts so that it can be understood. In action research, data are analyzed and organized into categories so that others might come to understand the reality you are trying to represent. Three elements related to data analysis are presented in this chapter: (a) accuracy and credibility; (b) validity, reliability, and triangulation; and (c) inductive analysis.

### ACCURACY AND CREDIBILITY: THIS IS WHAT IS

The ultimate goal of action research is to use your findings to make effective changes or choices. To this end, the collection and analysis of data must be accurate and credible. Accuracy in action research means that the data you are collecting creates a fairly true picture of the bit of reality you are observing. This helps you make decisions that are best for your particular situation. Credibility in action research means trustworthy or capable of being believed. This enables you and others to use your data with confidence. The following seven tips will help you establish more accuracy and credibility as you collect and analyze your data:

1. *Record your observations carefully and precisely.* Always double-check to make sure you are recording exactly what you are seeing.
2. *Describe all phases of data collection and analysis.* In your recording, recount all the steps used in collecting and analyzing the data. In your eventual reporting you want to create a level of clarity whereby another person could duplicate your steps.
3. *Make sure you record and report everything that is of importance.* Record and report fully, do not omit data that may be counter to what you believe. The goal is to understand fully all aspects of what you are observing.
4. *Be as objective as possible in describing and interpreting what you see.* Pronounced biases or hidden agendas are fairly easy to spot and prevent you from seeing all aspects of what you are trying to study. They also make your action research less accurate and credible.

5. *Use enough data sources.* (See triangulation below.) Your observations and analysis will be much more accurate and credible if you are able to find similar patterns using two or more forms of data. For a short observation (2 to 4 weeks), I usually ask my students to use a minimum of two sources. For longer action research projects, the number of sources is dictated by the question and the kinds of data you are trying to collect.

6. *Use the right kinds of data sources.* (See validity below.) The type of data you choose to collect should provide the most accurate understanding possible of your research topic. For example, if I were interested in understanding how middle school students use humor, I might interview classroom teachers. Although this could provide some interesting information, the data would be a poor reflection of the reality I was trying to observe. A much more accurate and credible view would be obtained by using audiotapes of actual conversations, by observing middle school students and taking descriptive field notes, and by creating a survey form in which students self-report to indicate the kinds of humor used and the instances in which it was used.

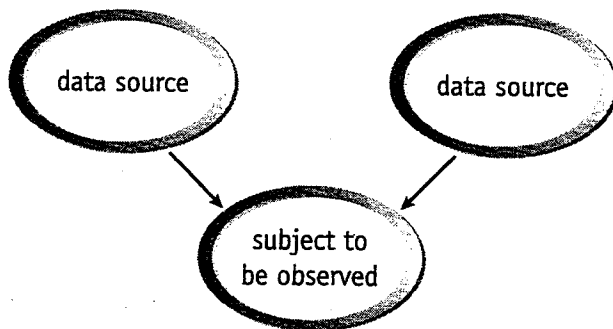
7. *Look long enough and deep enough.* A 3-week observation might provide some interesting data; however, a 3-month observation would make your data even more accurate and credible. Longer observations provide more chances to see and confirm patterns than do shorter observations. Again, the length of your observation and data collection is dictated solely by your question. The final criterion should always be the degree to which you have created an accurate picture of what was studied.

## VALIDITY, RELIABILITY, AND TRIANGULATION

Three essential parts of establishing accuracy and credibility in any research project are validity, reliability, and triangulation. In action research, they take on a different form than they do in traditional experimental research.

### Validity

How do we know your data actually assess and describe what they say they do? Validity is the degree to which a thing measures what it reports to measure. For example, in trying to assess the writing ability of elementary students, I could give them a standardized test of grammar and punctuation in which they would read a series of questions and choose one of four responses. This would produce some fairly accurate results that could be quantified and used to make comparisons; however, this type of measure does not look at writing in an authentic context, and thus, it is not a very valid measure of students' ability to organize and communicate their ideas using writing. A more valid assessment would be to look at students' actual writing samples and use the writing assessment form described in Chapter 7 to rate specific elements.



**FIGURE 8.1** Triangulation

### Triangulation

Triangulation means looking at something from more than one perspective. Think of a triangle with the subject to be observed as one point and the various data sources as the other two points (see Figure 8.1). Triangulation ensures that you are seeing all sides of a situation. It also provides greater depth and dimension, thereby enhancing your accuracy and credibility. In action research, triangulation is achieved by collecting different types of data, using different data sources, collecting data at different times, and by having other people review your data to check for accuracy and adjust your findings.

### Reliability

Reliability is the degree to which a study or experiment can be repeated with similar results. Unlike action research, traditional experimental research strives to create a hermetically sealed world with all the variables controlled so that X can be said to cause Y beyond all doubt. If the experiment is reliable, X should cause Y each time it is repeated. If this is indeed the case, the experiment is deemed reliable, the results are generalized to similar situations, and the researcher is granted tenure at a major university.

Action researchers, however, observe messy, real-world events in which humans are mucking about. These humans are inherently and wondrously unpredictable and not at all inclined to exist in hermetically sealed worlds. Thus, each time we search and research we expect to see different things. The closest we come to repetition is noticing recurring items, themes, or patterns that emerge from our data. (See inductive analysis below.) Therefore, action research findings are not generalized broadly, instead they are used to help understand particular situations as well as inform similar situations.

## INDUCTIVE ANALYSIS

Inductive analysis means to look at a field or group of data and try to induce or create order by organizing what is observed into groups. This should occur as

you begin to collect data. Look for recurring items, themes, or patterns to emerge. Similar things should be coded and moved into initial categories. These categories, however, should be very flexible as later data may change their nature and composition. It is helpful to begin this process while you are collecting data because the categories that form initially inform further data collection.

### Larry, Moe, and Curly Help with Inductive Analysis

Let me use the Three Stooges to illustrate inductive analysis. I watched a Three Stooges video to understand the Stooges and their humor. My initial questions were, What kind of humor is found? Of what are these episodes comprised? Who are the Stooges? (Note how these questions help inform and provide focus for my search.)

I watched a short 15-minute episode on videotape called *Grips, Grunts, and Groans* (Columbia Pictures, 1937) and began to look for instances of humor. (The events in a Three Stooges episode happen much faster than in real life; thus, I used the pause button often to suspend video reality to make notes.) As I watched, I used field notes to record those funny things I saw. *Funny things* (humor), in this instance, was defined as those elements inserted into the movie for the express purpose of creating a comedic effect. As I watched, my notes began to look like the following:

Bump, stumble, kick, punch, slap, poke, twist ear, word play silly, absurd  
silly, word play silly, absurd silly, etc.

After the first time through the video, I saw that the types of humor recorded in my notes could be put into four categories.

**Things-to-Head Violence.** This violence represents instances where a nonhuman thing hit or was dropped on somebody's head. For example, Larry hits Moe on the head with a board or an anvil falls on Curly's head.

**Human-to-Human Violence.** A part of somebody's body was struck, twisted, or otherwise violently engaged by a part of somebody else's physical being. This violence included instances of eye poking, ear twisting, kicks, chokes, punches, pushes, slaps, or general violence such as twisting one's foot.

**Self-Mishap.** These are instances in which characters cause their own mishap, including stumbles, bumps, or falling episodes.

**Silly Stuff.** Silly stuff represents those items, events, phrases, or actions that are incongruous, apart from what is normally expected, or reflect an exaggeration of what normally is. An example of situational silliness would be the Stooges accidentally pulling off the pants of a drunk wrestler while trying to drag him, revealing funny, long underwear with garters. An example of verbal silliness would be

what is said after a man throws water on the Stooges who were just knocked unconscious by blows to the head. Curly yells out, "Man the lifeboats." Moe says, "Woman and children first." The implication is that the Stooges acted as if they were on a boat that was sinking.

Each category contained different types of humor. Once I had my initial categories and subcategories, I created a version of an open-ended checklist (see Figure 8.2). I then viewed the episode a second time and put a tally mark next to each type of humor every time I observed it.

I was thus able to break down the humor into its component parts and get a good sense of what the total episode comprised. It looks as if, more than anything, the Three Stooges material was violent. Forty-three instances of humor were violence inflicted on another person (human-to-human and thing-to-head violence); however, silliness was the largest single category of humor. In this episode, the Stooges were sillier than I had imagined they would be; however, the amount of violence stands out to the viewer watching in the twenty-first century. To add credibility to my observation and analysis I viewed this particular video several times. I also had somebody else view it to see whether they came up with similar categories and numbers.

This inductive analysis gave me a good understanding of this single episode of the Stooges and their humor. To extend this study, I would need to observe several Stooges episodes and use the same categories to collect and organize data. This data would then be put in the form of a bar graph for easy consumption by the reader. This would also allow me to compare various Stooges episodes or to compare the Stooges to other comedians of that era or today. I might also choose to

**FIGURE 8.2 Three Stooges Humor**

SILLY STUFF		HUMAN-TO-HUMAN VIOLENCE		THING-TO-HEAD VIOLENCE		SELF-MISHAP	
Situational silliness:	26	General hurt:	5	Things dropped on head:	12	Bump or stumble:	9
Verbal silliness:	7	Slap:	5	Things hit on head:	11		
		Kick:	4				
		Twist ear:	2				
		Poke eye:	2				
		Punch:	2				
		Choke:	1				
		Push:	1				
<b>Total:</b>	<b>33</b>	<b>Total:</b>	<b>22</b>	<b>Total:</b>	<b>21</b>	<b>Total:</b>	<b>9</b>

investigate further to see whether early Stooges and late Stooges differ. I might want to pursue other questions: Did the type of humor change over time? Did the Stooges get more violent over time? Did they get more silly over time? Do HPM (humor-per-minute) ratios of the Stooges differ in various eras? Do males react differently than females to Stooges humor? (You may notice that a good study usually creates as many questions as answers.)

### **Case Studies or Representative Samples**

In my report I will use representative samples to bring further understanding to the Stooges reality that I observed. I will include a few examples of the funny things in each category so that the reader fully understands what that category entails. Including representative samples also allows the reader to go beyond the numbers, to make the research come alive.

#### **Verbal Silliness**

The scene opens with two railway security guards walking, clubs in hand, by a train car marked *horses*. One foreman taps on the door and says, "Anybody in there?" Curly's high, whining voice is heard, "Nobody here but us horses." The two guards, having gotten an answer to their question, begin walking away. After two steps, they realize the incongruity, stop, do a double take, and wait for the door to open.

#### **Verbal Silliness**

A gangster has made a big bet on Gustov, a professional wrestler. The Stooges have been paid by the gangster to keep him from getting drunk for that evening's match. Gustov is about to drink a large container of something when Moe says, "Listen, Gustov, you can't drink that. That's alcohol." Gustov snorts and says, "That's not alcohol. That's just a little tequila, vodka, and cognac." Curly says, "Oh, that's different. Go ahead." Gustov pours the jug down his throat. The bit of incongruity is that although tequila, vodka, and cognac are not referred to as alcohol, they all contain it.

#### **Situational Silliness**

Curly goes mad every time he smells Wild Hyacinth. In a restaurant, a woman accidentally pours some on him. Curly begins making high-pitched "woo, woo, woo" sounds. He slaps his forehead repeatedly, barks, and makes wild twisting, dancing motions with his legs. He goes crazy, trips over a table, and starts breaking a chair, then yells, "Moe, Larry, tickle my foot!" Larry and Moe tackle him, twist his legs, yank off his shoes, and begin tickling his feet. There is much flopping around and manic laughing by Curly and he eventually comes to his senses.

**Self-Mishap**

Running from the two railway guards, the Stooges round a corner. Two women are standing next to a baby carriage. In unison, the Stooges trip over the baby carriage and fall face first on the sidewalk.

**Human-to-Human Violence**

Moe tells Curly to put up his hands. He then hits him in the stomach. When Curly makes a sound in protest, Moe uses his fist to pound him on top of the head, twists and slaps his nose, and slaps his forehead. Curly yells in a loud, high voice, "Ow, ow, ow . . . ohhhh!"

**Things-to-Head Violence**

In the locker room before the big wrestling match, Larry, Moe, and Curly have finally succeeded in getting Gustov, the drunk professional wrestler, ready to go out and wrestle. They then accidentally knock him into a set of lockers. Five dumbbells that are on top of the lockers fall, one at a time, on Gustov's head.

**Vision Quest**

As another example of inductive analysis, I was interested in examining the idealized visions of the undergraduate students in my literacy methods course. That is, how did they see themselves teaching literacy when they got their own classroom teaching position? During student teaching I have often noticed a certain amount of stress when the idealized teaching visions of student teachers do not match their current teaching reality. For this action research project I was interested in seeing what the initial idealized vision was and how it changed throughout the semester as a result of my instruction and their field experiences.

Twenty-five students were in my undergraduate literacy methods course, 22 females and 3 males. Most of the students were in their early twenties; however, two females and one male were in their late thirties or early forties. To get at their idealized visions, I gave them the following writing prompt: "Imagine yourselves 5 years from now. You are in a regular classroom teaching some aspect of literacy. What do you see? What's going on? What does it look like?"

Students wrote one to two paragraphs on a sheet of paper. I collected them and analyzed this data, looking for patterns. This was repeated at 1-month intervals four times during the semester. I called this Vision Quest. The following are some examples of students' responses:

**8/31/99**

I see myself stressing meaning and feeling within the message and words of books. I will probably assign or suggest books with these

characteristics—books that share good family ties, struggle, success, hard work, etc. [female]

In 5 years I see my students participating in short skits or role plays to share what a book was about or an individual chapter. The plays will be written and directed by the students themselves (with help as needed). [female]

In 5 years I see myself modeling quiet reading time for my students. I also see myself incorporating reading into other subject areas. I do not see myself doing comprehension sheets or book reports. [female]

I see myself teaching second grade. The students are seated on the floor next to me while I introduce our book. They listen to me read while they follow along in their book. Then they have the opportunity to explain the story in their own words, with a story board, or acting it out. Later, they will be able to write about the story, perhaps including themselves. They will be able to draw pictures. These will be displayed. [female]

As I read through students' descriptions, I looked for patterns, themes, or similar kinds of things. For instance, many students described aspects of creating a warm, inviting classroom environment. In my notes I jotted down *warm-fuzzy, environment, atmosphere* as an initial category. Every time I found something related to creating a warm, comfortable environment, I put a tally mark by this descriptor. I read all the selections and made adjustments to my initial categories. Figure 8.3 shows which categories and subcategories I used. I then went through the data a second time and once again put a tally mark every time an instance of an activity fell within that category. This twice-through approach allowed for more accuracy.

### Defining and Describing Categories

One cannot expect the reader to have complete understanding of my categories, so, just as with the Three Stooges, I must define and describe each category. To demonstrate I have included the following examples:

#### **Holistic or Nontraditional**

This category represents activities that might fit within a whole-language classroom, specifically, activities that would *not* reflect a basal or skills-based approach. The subcategories include:

**Reading choices.** Students would be able to make choices about the kinds of books they want to read.

**Creative projects.** Activities would include drama, role play, art, games, and puppets.



FIGURE 8.3 Vision Quest, First Month

<b>I. Warm Environment</b>	<b>6</b>
<b>II. Holistic/Nontraditional Activities</b>	<b>16</b>
A. Reading choices	4
B. Creative projects	3
C. Student-centered activities	4
D. Class library/books	2
E. Independent reading	3
<b>III. Skills-Oriented/Traditional Activities</b>	<b>23</b>
A. Vocabulary instruction	4
B. Basals and worksheets	8
C. Teacher-led discussion	3
D. Round robin reading	8
<b>IV. Teacher Reading to Class</b>	<b>8</b>
<b>V. Specific Pedagogical Methods</b>	<b>2</b>

**Student-centered activities.** Students would be in charge of a process or a final product or performance. For example, students would write and direct their own plays, or students would be able to retell a story in their own words using a story board.

**Class library/books.** A prescribed place in the classroom with lots of books would be set aside as a reading area.

**Independent reading.** Time would be scheduled for students to read books of their choice independently.

Below is an example of how I might put the data into categories:

I see myself sitting in a cozy chair with my students sitting on a large soft rug in front of me. [*Warm Environment*] In my hands I hold a brand-new book. I introduce the book to the children and I begin to read aloud. [*Teacher Reading to Class*] When I have finished reading, we discuss the book. [*Teacher-Led Discussion*] [female]

I see myself in 5 years with a large selection of books that I have read and am comfortable with. [*Class Library/Books*] Students choose their own books. [*Reading Choices*] I will allow ample class reading time. [*Independent Reading*] [female]

I see myself helping students learn new words by using overheads. As a class we would read the words together, then use them in sentences. [*Vocabulary Instruction*] I just think it will be exciting to have them learn new words. [female]

I see myself reading to students every day. [*Teacher Reading to Class*] Students in my classroom will have free time to read every day. [*Independent Reading*] Perhaps there will be a special reading corner. [*Warm Environment*] I plan to use trade books in reading class and across the curriculum. I really like that idea. I would like to have a large library in my classroom. [*Class Library/Books*] [female]

I see myself setting up a small library in my classroom where children are able to read when they are done with their work. [*Class Library/Books*] I would make my library full of color, pictures of books, and many comfortable chairs to create an inviting reading environment that would make children look forward to reading. [*Warm Environment*] [female]

### The Next Month

The next month the same categories were used. As you might expect, the change reflects my instruction, the literacy philosophy I was proposing, and students' interaction with these ideas (see Figure 8.4). In Chapter 16 you can see how this

**FIGURE 8.4 Vision Quest, Second Month**

<b>I. Warm Environment</b>	<b>11</b>
<b>II. Holistic/Nontraditional Activities</b>	<b>64</b>
A. Reading choices	24
B. Creative projects	12
C. Student-centered activities	5
D. Class library/books	5
E. Independent reading	18
<b>III. Skills-Oriented/Traditional Activities</b>	<b>9</b>
A. Vocabulary instruction	1
B. Basals and worksheets	3
C. Teacher-led discussion	5
D. Round robin reading	0
<b>IV. Teacher Reading to Class</b>	<b>15</b>
<b>V. Specific Pedagogical Methods</b>	<b>17</b>

data was reported in graph form. One final thought: Methods used for inductive analysis vary and are a matter of personal preference. And although it might seem very messy at first, you will get more comfortable with this process by doing it.

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## SUMMARY

- Analysis means to break down something into its component parts so that it can be understood.
- The collection and analysis of data must be accurate and credible to be of use in making effective changes or choices.
- Validity is the degree to which a thing measures what it reports to measure.
- Triangulation means collecting more than one form of data or looking at something from more than one perspective.
- Reliability is the degree to which a study or experiment can be repeated with similar results.
- Action researchers recognize that the universe they are observing is a messy, unreliable entity, and thus, they look for repeating patterns and themes to help them understand it.
- Inductive analysis means to observe a field and create order by organizing items into groups or categories.
- In using inductive analysis, initial categories should be flexible as later data may change their nature and composition.

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## QUESTIONS AND ACTIVITIES

1. Cut out a newspaper article, a description of research, or a research article that you feel lacks credibility. Tell why.
2. Find an interesting person or student to observe for a short time. Use two of the data sources described in Chapter 7 to create understanding.
3. Cut out an ad in a newspaper or magazine that you feel lacks validity. Tell why.
4. Practice inductive analysis by randomly generating a list of 25 nouns. Then, in a small group or individually, put order to this field by moving them into groups or categories. Describe your field in terms of categories and numbers in each category.
5. Go to a place that is interesting and unique where you can observe people. Use field notes to record the behaviors you see. Then use inductive analysis to put order to your data. Report your data in terms of categories and numbers in each category.
6. Extend the previous activity by creating a checklist or data retrieval chart that uses the categories described. Go back to your interesting place at a different time of day. Use tally marks to record the instances of behaviors you observe.

Add new categories if you need to. Create a graph to compare and report your observations and conclusions.

7. To extend the previous activity further, use the same checklist or data retrieval chart to observe a different but similar place. Create a bar graph to compare and report your observations and conclusions.