

# Teacher's Guide

## Practical Mapping for Applied Research and Program Evaluation

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This textbook is about how to conduct social science research (including program evaluations) and create knowledge maps (KMs). Those maps become the focus for evaluating the quality of the research on three dimensions: meaning (Chapter 2), data (Chapters 3 and 4), and logic (Chapter 5). Importantly, those maps are also useful for collaborating with other researchers to advance knowledge in the field (Chapter 6) and stakeholders for collaboratively planning effective action (Chapter 7). That usefulness serves to improve the impact of research and evaluations.

Here, we provide teachers with a chapter-by-chapter and section-by-section guide to using the book as a primary or secondary textbook for a course on applied research or program evaluation. You can use the exercises in the book as they are presented or revise them to fit neatly with your existing syllabus.

# GENERAL

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## CLASSROOM SCHEDULING AND LOGISTICS

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Times listed are approximate and may vary widely depending on the students' level of skill, the depth of exploration to be encouraged, and the size of the class. A class of 12 students will take much less time than a class of 200. We recommend a maximum class size of about 16 students. A larger class may be subdivided with an aid assigned to facilitate each group of students.

The activities in this book should be doable for most graduate students. We have also added notes throughout this guide for making activities more accessible to undergraduates.

For students to create their knowledge maps, you will need to provide them with markers, tape, large sheets of paper, and 3 × 5 cards or similarly sized sticky notes.

## CONNECTING WITH OTHER COURSES

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One option for using this teacher's guide is to insert the various activities in the book and in this guide into your existing syllabus.

Another option is to use the syllabus (available on the same website with this guide through the link below) as a stand-alone for a quarter (10 week) course, available here: <https://practicalmapping.com>.

Third, the syllabus may be used for the first 10 weeks of a full semester (15 week) course—the final five weeks would be used to cover additional material (e.g., qualitative methods such as interviewing, mixed methods such as surveys and contribution analysis, quantitative methods such as computer modeling).

## KEY DIRECTIONS

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Key to mapping is scientific thinking. Specifically, each map must be made of concepts/variables that are measurable, and connections between those concepts must indicate causal relationships. It has been argued (particularly from a postmodernist perspective) that there are many things of great importance that are inherently unmeasurable (or that the process of measurement will change the thing being measured). It has also been argued that causal relationships may be uncertain or confusing (and, of course, correlation is not causation). Be those as they may, the research shows we are able to better understand and resolve our problems when our maps include measurable concepts with causal connections. So it is incumbent upon researchers to strive for *better* maps (which may include the integration of *different* maps). This book points the way.

## TEAMS

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This guide (and syllabus) assumes that the teacher has some experience working with students in teams.

### Chapter Teams

Very early in the course, students choose one chapter of particular interest and form into teams. Each chapter team studies one chapter in depth and makes a presentation to the class as a whole. They may also facilitate activities from the book.

This approach has many benefits. First, students learn to work together in teams (this comes in handy for project teams). Second, when student presentations include examples of real-world events (as they often do), those events and the way that they are presented tend to be more generationally/culturally appropriate. That is, the message has the opportunity to get through to the other students more effectively. Third, when freed of some (relatively mundane) classroom tasks, the teacher can focus more on working with students to inform, encourage, and evaluate them.

## Team Time

One way to use this book is to have students work in teams on research projects.

Working with real-world organizations provides an amazing opportunity for student learning. As a team, students contact organizations they may know from their personal/professional networks. (You may provide a letter affirming that the students are conducting the research as part of your class.) Often, organizations are happy to support students because:

- The time cost is not too large
- Students are typically unpaid
- Leaders may learn something about their own organization (it is customary to provide a copy of the students' final paper to the client)

Typically, students negotiate with a manager or other organizational leader to gain access. Then, an agreement is drawn up which includes details of timing, who is to be involved, and the confidentiality of the project.

The syllabus sets aside some in-class time for team activities such as the following:

- Reporting their progress to the class as a whole
- Asking questions of the teacher
- Talking among themselves

## PROJECTS

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If this book is used to support project-based learning, here are a few major options for adjusting the workload for student projects:

*Light*—No outside projects. All project work is done in class.

*Medium*—Project is focused on a literature review (Chapter 3), which may be done individually or in small teams. The scope of the literature review depends on the skill level of the students and the time allotted by the course.

*High*—Project is focused on evaluating a program in the real world. Student teams go out and find a “client” (not a paying client), then interview a number of the stakeholders (e.g., managers, director, workers, clients who receive services, etc.) using skills from Chapter 4. Then the students prepare reports of their interview results, which they bring to class and give to the clients.

*High*—Project is focused on a collaborative mapping project (Chapter 2). Student teams find a “client” and schedule a time for stakeholders to spend 2 to 8 hours creating a map, which they then provide to the client and bring to class.

*High*—As above, student teams find a “client.” Project includes some combination of literature review, interviews, and client mapping. The final map would be integrated from two or more maps.

A “fallback option” (if student teams have difficulty finding a client or if a student team “crashes”—see Chapter 2 for tips for working with teams to help avoid that) is to have students conduct a study of this class/course. They would interview the professor and their classmates to identify the goals and activities of the class and what worked well and what improvements could be made. There, they would be looking at the course as if it were a kind of “program” to be evaluated for impact and/or potential improvement.

## EXERCISES FOR ALL CHAPTERS

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At the end of each chapter are two sections: FAQs (frequently asked questions) and Further Exploration (directions for students who want to engage in deeper exploration of the subject matter). Each section may also serve as the starting point for additional exercises. Those potential exercises are noted here but not included in the syllabus.

*FAQs*—Working in groups or as individuals, students consider the chapter and develop one or more additional questions (not covered in the FAQ section of the book) about the material. Those questions may be presented for conversation by the class as a whole or within student teams. Additionally, the student groups may develop answers to those questions based on those conversations. Then, those questions and answers may become part of a paper and/or project and/or be reported back to the whole class.

*Further Exploration*—Working individually or in teams, students review the list of material in the Further Exploration section of the chapter. Each student reviews the available material to find one (or more) papers/sources to select for exploration. Within that selected material, the student finds something of interest and reports that information back to the class. That information may become part of a paper and/or project.

At the end of the book is a glossary. This may be used as the start of a “short answer” exercise to test student knowledge at the end of the course. A test could include a list of terms and the instructions such as, “In your own words, define, explain, and provide an example of each of the following terms.” A short test may be devised for each chapter individually by creating a quiz of this sort based on the terms found in the Definitions boxes in that chapter. However, please note, some chapter have more definitions than others (many in Chapter 1, while Chapters 6 and 7 have only one definition each).

Because the definitions in this book are very basic “nuts and bolts,” students could also be encouraged or required to investigate the literature and find deeper or alternative definitions of those terms. The similarities and differences between those definitions could provide interesting topics for papers and conversations, particularly for graduate students.



# THREE DIMENSIONS OF KNOWLEDGE FOR SOLVING COMPLEX PROBLEMS: MEANING, DATA, & LOGIC

In this chapter, we introduce some big problems of the world and talk about how research helps us to understand and resolve those issues. Key to this chapter (and the book as a whole) is that students learn how to evaluate the quality of their research on the three dimensions of *data*, *meaning*, and *logic* (and importantly, “logic” here refers to *casual* logic—the understanding of causal relationships between two or more things). Generally, we gain more confidence in research when it has higher scores on all three dimensions.

Reflection/Discussion	30 Minutes
<p>Look at the first Reflection/Discussion feature in Chapter 1 (copied here).</p> <p>On your own or in small groups, consider these questions:</p> <ul style="list-style-type: none"><li>• What are some local, national, or global issues where the two (or more) sides have disagreed over the best course of action?</li><li>• Do all sides agree on whether or not enough research has been conducted?</li><li>• How long has the problem gone on?</li><li>• Has progress been made in understanding and solving it? Why or why not?</li></ul>	<p><i>Undergrads</i>—Direct them to talk about one question at a time.</p> <p><i>Option</i>—Encourage students to identify where research has been done and what points of view have been presented. For the next class, have them bring a news article and discuss whether or not the news article cites credible sources.</p> <p><i>Option</i>—Students report a summary of their individual reflection or small group conversation back to the whole class.</p>

<b><i>Class Activity 1.1. Evaluating Evidence</i></b> See Class Activity 1.1 in the book (copied here without the figure and table).	30 Minutes
<p>In this section, we provide a hypothetical example, based on real events, to help you understand how to use mapping and to evaluate the quality of mapped research based on the three dimensions presented in this chapter. As you read the study, note how meaning, data, and logic are represented. Then, use the Knowledge Appraisal Matrix (Table 1.3) to evaluate the quality of the knowledge map (Figure 1.6). Afterward, consider the questions for reflection and discussion and describe how you could conduct a better research project.</p>	<p><i>Option</i>—Professor provides an alternative example or case study for students to analyze instead of the example presented in the book.</p> <p><i>Option</i>—Students may work individually or in small groups.</p>

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<b>Class Activity 1.1. Evaluating Evidence</b> <b>See Class Activity 1.1 in the book (copied here without the figure and table).</b>	<b>30 Minutes</b>
<p><i>Background:</i> A national debate has emerged over whether or not to continue funding for a billion-dollar program that provides support for after-school activities for children across the United States. Both sides present their perspectives. Opponents of the program say it should be cut because it doesn't have enough evidence to support its continued operation. Advocates for the program say it has enough evidence.</p> <p><i>Your role:</i> A political organization hires you to conduct an independent analysis of the evidence from one recent study of the program. Your task is to read the following study and describe some of its strengths and weaknesses (your findings will be used to inform the organization's advocacy strategies).</p> <p><i>The study:</i> In the study, the U.S. General Accountability Office (GAO, 2017) examined what was known about the effectiveness of afterschool programs funded by the Department of Education's 21st Century Community Learning Centers (21st Century) grants program. GAO reviewed findings from a total of ten studies—four state program evaluations and six other studies that examined student outcomes.</p> <ul style="list-style-type: none"><li>• Of the four state evaluations that GAO reviewed, three found that afterschool programs had a positive effect on school-day attendance. One of the studies that GAO reviewed, which was a meta-analysis of 30 studies, also found a positive effect of afterschool programs on school attendance.</li><li>• Two of the state evaluations found that afterschool programs had a positive effect on school-day discipline (reducing disciplinary problems). The Texas evaluation showed that centers that taught students face-to-face rather than via computer and those that focused on general learning strategies rather than on specific subject area skills were associated with fewer disciplinary incidents.</li><li>• None of the 10 studies in GAO's review found consistently better scores in either math or reading in program participants' state assessments.</li></ul> <p>Figure 1.7 presents a map created from the key findings of the GAO study. In the figure, each arrow shows which of the study(ies) that GAO reviewed provided evidence for that arrow (more on this kind of presentation in Chapter 7).</p> <p><i>Instructions:</i> Consider Figure 1.7 and circle the appropriate boxes on the Knowledge Appraisal Matrix on Table 1.3.</p>	
<b>Reflection/Discussion</b>	<b>30 Minutes</b>
<p>Look at the second Reflection/Discussion feature in Chapter 1 (copied here).</p> <p>Reflect on and discuss the results of your assessment from Class Activity 1.1.</p>	<p><i>Undergrads</i>—May direct students to talk about each question, one question at a time. Stop between questions to have students present their findings briefly to the class and have a general conversation before proceeding to the next question.</p>



Reflection/Discussion	30 Minutes
<ul style="list-style-type: none"> <li>• Compare your assessment with that of others in the class.</li> <li>• What was similar or different between your assessments?</li> <li>• If they were different in any way, why do you think they were different? What research could you conduct (that would be added to the research presented in Activity 1.1) to reach higher levels of knowledge on each dimension?</li> </ul>	
Ethics	<p><i>Note</i>—There is not an exercise for ethics. However, if you have one, this would be a great place for it.</p> <p>The American Evaluation Association (AEA) Guiding Principles Training Package provides some useful small group exercises and other materials on ethical evaluation practice:  <a href="https://www.eval.org/p/cm/ld/fid=105">https://www.eval.org/p/cm/ld/fid=105</a></p> <p>Alternatively, this is a great place for a more general classroom conversation around ethics.</p> <p>Or you can ask students to look into the Further Exploration materials on ethics (see our suggestion in the preceding General section about using those materials to support additional class activities).</p>

# 2

## MEANING: A COLLABORATIVE MAPPING APPROACH

In this chapter, students focus on improving the quality of research (and resulting knowledge maps) along the dimension of “meaning.”

The first *key* to this idea is that the more stakeholders (and more stakeholder groups) adding to the map, the more relevance (or meaning) the map will have for the stakeholders and their situation/context/problem. The exercises in this chapter help students learn to identify stakeholder groups, choose a topic, and create a map.

The second *key* to this chapter is learning the process of collaborative knowledge mapping and how it may be used to surface and integrate insights within and between stakeholder groups.

<b>Reflection/Discussion</b>	<b>20 Minutes</b>
<p>Look at the Reflection/Discussion feature in Chapter 2 (copied here). Imagine that your community has a problem with crime, pollution, or lack of economic growth. It has been going on for so long that nobody knows when it started and why. Everyone is saying that someone should do something. Some people think they have a simple answer, but people have different views of what the answer is. This suggests different understandings of the causes of the problem. But despite the efforts of concerned residents and elected officials, the situation is slowly growing worse instead of better. Reflect or discuss in a small group:</p> <ul style="list-style-type: none"> <li>• What organizations and individuals in your community might have an interest in the topic?</li> <li>• Which groups and individuals would you bring together for a collaborative knowledge mapping process?</li> <li>• How might they (and the community) benefit from such a process?</li> </ul>	<p><i>Option</i>—Report back results to whole class.</p> <p><i>Option</i>—Professor provides an alternative topic.</p> <p><i>Option</i>—Students choose a topic.</p> <p><i>Option</i>—Brainstorm and choose a topic (e.g., economic equality, racial bias in policing, legal defense services for people accused of crimes, services to help people released from incarceration to return to the community and get jobs, law enforcement) then search online for specific local organizations (e.g., local nonprofit organizations, national foundations, city police, county sheriff, etc.).</p>
<b>Class Activity 2.1. Practicing Facilitation for Choosing a Topic</b>	<b>20 Minutes</b>
<p>Do Class Activity 2.1 (copied here). Working in small groups, choose one student in your group to act as facilitator. In your group, discuss and agree on a topic for a mapping activity (you will do the actual mapping later in this chapter). That topic could be anything—from a global problem (such as wealth inequity) to a local problem (such as voter participation). You might brainstorm to</p>	<p><i>Option</i>—Instead of working in small groups, the conversation could include the whole class.</p> <p><i>Option</i>—Professor provides the topic (based on class focus, current events, case study, etc.).</p>

<p><b>Class Activity 2.1. Practicing Facilitation for Choosing a Topic</b></p> <p>come up with a wide range of possible topics. Then, categorize those possible topics and discuss why each one might be of interest.</p> <p>Finally, vote on which topic will be your group's focus for creating a map. You might use "dot voting," with each person receiving 3 to 4 dots (stickers) and then placing the dots on their topics of interest. This gives each person the opportunity to express interest in a range of possible topics. The topic with the most dots wins (other topics may be mapped at a later date or may appear during the mapping process as concepts placed by participants).</p>	<p><b>20 Minutes</b></p> <p><i>Note</i>—Better to focus on one issue here. Future activities will involve integrating multiple maps (Chapter 6).</p>
<p><b>Class Activity 2.2. Collectively Creating a Map</b></p> <p>Do Class Activity 2.2 from the book, copied here.</p> <p>Use the topic your student group developed in Class Activity 2.1 (along with the "Participants' Guide to Knowledge Mapping" and "Tips for Facilitating Groups" handouts provided in this chapter).</p> <p>Choose one student from your group to serve as group facilitator (a different person from the person who was facilitator in Class Activity 2.1).</p> <p>In your group, spend about 45 minutes collaboratively creating a map, including the perspectives of everyone in your group on your group's topic.</p>	<p><b>45 to 90 Minutes</b></p> <p><i>Note</i>—Mapping is often best when done by groups of 5 to 8 people. With too few, we lose the generative effect of the group (a la brainstorming); with too many, a few people may dominate while others become reluctant to contribute.</p> <p><i>Option</i>—If the students are unfamiliar or uncomfortable with mapping, a demonstration may be helpful. Use the "fishbowl" technique, where a few students (who are picking up the material more quickly and are more comfortable engaging with mapping) create a map while other students watch, followed by a Q &amp; A session to resolve any lingering concerns.</p> <p><i>Option</i>—Small groups present their maps back to the whole class.</p> <p><i>Key</i>—Each part of the map may be checked or tested by "reading" the part aloud—for example, "more of this concept causes more of that concept." Reflect back to the class . . . "Does that sound reasonable?"</p>
<p><b>Class Activity 2.3. Considering Options Presented by Maps</b></p> <p>Review and reflect on the map that your group created in Class Activity 2.2. Choose one student from your group to serve as facilitator (a different person from who served as facilitator in Class Activities 2.1 and 2.2). Using the suggestions from Stage 3, the facilitator ask questions of the group. The rest of the group (acting as stakeholders and/or as yourselves) discusses their response to the questions as you consider your options presented by your map. Meanwhile, someone else takes notes on the discussion and decisions made for each question.</p>	<p><b>30+ Minutes</b></p> <p><i>Option</i>—Present results back to entire class.</p> <p><i>Note</i>—the main idea here is to choose options for action. This is more doable when the concepts are measurable (e.g., number of fundraising activities conducted each year) and when the connections between them are causal (e.g., having more fundraising activities causes us to have more funds).</p> <p><i>Note</i>—Look for "transformative" concepts (circles with more than one arrow pointing at them) because those indicate greater understanding of the concept and so greater chances for successfully reaching goals.</p> <p><i>Note</i>—For particularly difficult concepts (e.g., crime), remind students that they should "back-map" (see glossary) to make change more possible. Note that students may disagree about what the problem "is"—for example, some may see the problem as "crime," while others may see the problem as "police bias that results in too many African American and Latino American men in jail." Others may see the problem as "wealth disparities" that lead to crime. Still others may see the problem as "a culture of oppression of women that results in sexual assault crimes against women" or that there is a need for more enforcement of corporate crimes such as wage theft. Through mapping, students might shift their understanding of what the problem is and, more importantly, to how all of those perceptions of problems are interrelated.</p> <p><i>Note</i>—This is a "light" approach to understanding action planning and decision making. A brief exercise to give students a feel for what it is all about. For more depth, see Chapter 7.</p>



## DATA: MAPPING FROM RELATED RESEARCH AND MATERIALS

In this chapter, students learn how to create knowledge maps from related (existing) research material (academic papers, program reports, strategic plans, policy models, logic models, etc.). This may be part of a literature review. The main difference between this approach and doing a literature review without mapping is that the mapping process is useful for organizing/understanding information and evaluating (with some level of objectivity) the quality/usefulness of the knowledge gained from the literature review.

*Key* is to remain true to the source. Students should not interpret the results or add their own insights to the maps. They can interpret maps later when making recommendations for action and/or additional research.

This chapter may be seen as one large case study, divided into five specific steps.

- Step 1. Searching for and choosing studies (and other related research and materials)
- Step 2. Creating a table of studies
- Step 3. Extracting and organizing information from studies
- Step 4. Assessing research quality
- Step 5. Mapping the knowledge from studies

Each of those steps suggests the opportunity for student activity. These steps will guide students toward completing a mapped literature review. The depth of that review will depend on the skill level of the students and the time available to do the work.

<b>Class Activity 3.1. Creating Maps From Related Studies</b>	<b>45 Minutes</b>
<p>Review the example excerpted study information from the NMAC Strong Communities project, in Table 3.4.</p> <p>Working in teams of two to three students, identify concepts and circle them. Identify causal relationships between the concepts and draw arrows to indicate the causal relationships. Draw small maps of each circle and arrow in the page margin to the right of the study information (as we did in Figure 3.2).</p> <p>Discuss the following in your group:</p> <ul style="list-style-type: none"><li>• What questions did you have about what concepts and relationships to include on the map? How did you resolve those questions?</li><li>• Do you see any logical gaps (places where additional circles and arrows might exist but are not explicitly stated in the study information) that might need more conversations and/or more research?</li></ul>	<p><i>Note</i>—Requires Handout 3.1 in book and online at <a href="http://www.practicalmapping.com">www.practicalmapping.com</a>.</p> <p><i>Option</i>—Professor assigns alternative source of material instead of 3.1 (<i>Note</i>—should keep it simple).</p> <p><i>Option</i>—Students find a report online for analysis.</p> <p><i>Option</i>—Evaluate the results using the Knowledge Appraisal Matrix from Chapter 1.</p> <p><i>Option</i>—Student groups present results to the whole class (<i>Note</i>—This is an opportunity for whole-class conversations on similarities and differences of results).</p>

<b>Class Activity 3.2. Mapping From Program Materials</b>	<b>30 Minutes</b>
<p>Review the project description in Figure 3.6. This was part of a grant proposal for the Howard University <i>PAC-Involved: Engaging Students in PAC (Physics, Astronomy, Cosmology) Learning through Repurposing of Popular Media</i> pilot project (we'll return to this project in Chapter 4).</p> <p>Working in teams of two or three students, identify concepts in the project description and circle them. Identify causal relationships between the concepts and draw arrows to indicate the causal relationships. Draw small maps of each circle and arrows in the page margin to the right of the study information (as we did in Figure 3.2).</p> <p>Discuss the following in your group:</p> <ul style="list-style-type: none"> <li>• What questions did we have about what concepts and relationships to include on the map? How did we resolve those questions?</li> <li>• Where are the spots on the map where you have questions or need more information, from conversations with your team?</li> </ul>	<p><i>Note</i>—Requires handout (available in the book and online).</p>

<b>Bonus Activity (not in book)</b>	<b>Significant Time Required</b>
<p>First—choose a topic for research.</p> <p>Follow the Five Steps to Mapping from Existing Research.</p> <p>Step 1. Searching for and choosing studies (and other related research and materials)</p> <p>Step 2. Creating a table of studies</p> <p>Step 3. Extracting and organizing information from studies</p> <p>Step 4. Assessing research quality</p> <p>Step 5. Mapping the knowledge from studies</p>	<p><i>Option</i>—The topic for research may be assigned by the professor, chosen by the students, be based on the focus of the course, or it may be based on the topic(s) of interest chosen in Chapter 2.</p> <p><i>Note</i>—Generally, students should read about each step in the book and apply that to their own research.</p> <p><i>Option</i>—Professor may assign specific databases or source material for students to analyze.</p> <p><i>Option</i>—This process may be assigned as homework and results discussed in class at each step.</p> <p><i>Option</i>—This process may be conducted as part of a larger student research project with clients that the students find outside the classroom.</p>

# 4

## MAPPING FROM YOUR OWN RESEARCH

In this chapter, we touch very briefly on how to choose research questions (or evaluation questions—depending on the focus of your course) and methods to answer those questions. Then, we focus on interviewing as an effective method for gathering information about complex situations. Students learn how to set up and conduct interviews and create causal knowledge maps from the interview data.

This chapter starts students with a more traditional approach to logic models (in linear form) and moves them (through data collection and analysis) toward a knowledge map from their research results that improves upon the initial logic model.

A wider variety of research methods is provided in Appendix C.

*Key* here is learning how to acquire information from the field regarding a program or policy situation through one's own research, then how to use that information to create a knowledge map.

<b>Class Activity 4.1. Thinking About Multiple Methods</b>	<b>30 Minutes</b>
<ol style="list-style-type: none"> <li>1. Working as individuals (or in small groups), imagine a problem that you would like to help solve (in your community, school, work, etc.).</li> <li>2. Consider the research methods listed above and choose one or more that you might use for answering your evaluation questions.</li> <li>3. Consider what each method might see in that situation and what it might miss.</li> <li>4. Present your results to the class for conversations and alternative suggestions.</li> <li>5. For “bonus points,” explain how each method you chose might build on another method or fill in the gaps left by another method.</li> <li>6. For “double bonus points,” consider the additional research methods in Appendix C and discuss whether any of those methods could be useful for answering your evaluation questions.</li> </ol>	<p><i>Option</i>—This could be the foundation of a written assignment, with the length of the paper determined by the needs of the course.</p> <p><i>Note</i>—This is a good opportunity for the professor to provide students with information about other research methods.</p> <p><i>Note</i>—This is a good place to include instruction about additional research methods.</p>
<b>Reflection/Discussion</b>	<b>30 Minutes</b>
<p>See the Reflection/Discussion feature in Chapter 4 (copied here).</p> <p>On your own or in small groups, think about an improvement that you'd like to see in your community. You might choose to use the same situation that you discussed in Class Activity 4.1.</p>	<p><i>Option</i>—Students may start with the community-based issues and/or stakeholder organizations that they identified in Chapter 2 (Reflection/Discussion).</p>

Reflection/Discussion	30 Minutes
<p>Brainstorm a list of organizations and/or groups who might be interested (either for or against) that change.</p> <p>Next, consider which individuals within those organizations might be best to interview—that is, identify who would be able to provide valuable information, experiences, and opinions to better understand and plan how to make the change (or, if it should be made at all).</p> <p><i>Hint</i>—You can often find lists of people on the websites of organizations that are active on the issue.</p>	

Class Activity 4.2. Interview Practice	60 Minutes
<ol style="list-style-type: none"> <li>Working individually, think of something you would like to learn from your classmates.</li> <li>Again individually, create a list of three to four open-ended questions to ask your classmates to help you learn about that topic.</li> <li>Work in groups of three, with one person asking questions, the second person responding, and the third person observing. After about 10 minutes of interviewing, conduct a debriefing with all three, talking about what went well in the interview and what the interviewer might do better next time.</li> <li>Then, rotate roles and repeat.</li> </ol>	<p><i>Option</i>—Professor chooses topic for interview.</p> <p><i>Option</i>—After groups develop their questions, they are shared with the class to provide suggestions for improvement.</p> <p><i>Option</i>—Use phones to record interviews (with permission). Then, use recordings to help evaluate the interviews and provide higher quality feedback (will require more time).</p> <p><i>Option</i>—Have students sit at different locations (in the classroom or around the campus) and conduct phone interviews. It may be interesting to compare the experiences of live versus online!</p> <p><i>Note</i>—This is a good place to bring in additional material on interview skills, such as the materials on interviewing referenced in the Further Exploration section of Chapter 4 (more practice is better).</p>

Class Activity 4.3. Mapping From Research Findings	45 Minutes
<p>Instructions: Working in small groups, identify and map propositions (circles and arrows) from the research summary below (also available online).</p> <p>First, read the summary. Then collaborate with others in your group to identify and map concepts and causal relationships that you see. You can write in the margins of the page. Use an extra piece of paper if you need it.</p> <p>Then discuss the following among yourselves in your small group and as a class:</p> <ul style="list-style-type: none"> <li>Were there any concepts or relationships that your group was unsure of how to map or that they had different opinions about how to map? If so, how did you handle those areas of uncertainty?</li> <li>Did everyone in your group generally agree about how to map everything?</li> </ul>	<p><i>Option</i>—Use results of in-class interviews to create maps.</p> <p><i>Bonus option</i>—If this is done, the mapper may bring the map back to the interview subject for a quality control check. Essentially asking “did I get it right?” This, in turn, provides an opportunity for improving the map with an additional interview. Also, it helps the interviewee learn about the limits of his or her own knowledge.</p> <p><i>Option</i>—Present maps to whole class for discussion and consideration of alternative interpretations of the data.</p>

# 5

## LOGIC: EVALUATING THE STRUCTURE OF KNOWLEDGE MAPS

In this chapter, students learn to evaluate the structure of their causal knowledge maps.

*Key* here is that maps with a higher percentage of “transformative” concepts (circles with more than one arrow pointing at it) are more highly structured and so more likely to be useful for understanding and resolving social problems.

*Another key* here is that noncausal approaches to mapping require that the reader make an “inferential leap” (of greater or lesser distance) as they move from reading the map to making decisions or implementing plans. The larger the leap, the greater the chance of making poor decisions leading less optimal outcomes and more unanticipated problems.

<p><b>Reflection/Discussion</b></p> <p>Look at the first Reflection/Discussion feature in Chapter 5, copied here.</p> <p>Look at the four diagrams (graphic recording, organizational chart, Venn, and flowchart). Notice how each has a different structure—a different way of presenting the concepts and the relationships between them. What is similar and what is different between the four? How might each be interpreted in a way that supports decision-making?</p>	<p><b>20 Minutes</b></p> <p><i>Option</i>—Working individually, students choose a problem/situation based on their own experience/work and so forth. Then, each student creates a diagram to represent that situation—based on one of the four styles of diagrams (Venn, flowchart, graphic recording, and organizational chart). Next, each student hands their diagram to another student. How well is the second student able to understand the situation from the diagram alone?</p> <p>Try sharing each diagram with multiple other students. Do any two students make exactly the same inference for what action is required to solve the problem based on the diagram?</p>
<p><b>Reflection/Discussion</b></p> <p>Look at the second Reflection/Discussion feature in Chapter 5, copied here.</p> <p>What diagrams or knowledge maps have you seen or used at work or in school? What did they look like? Were they useful, and if so, how? What kinds of problems or limitations did you have with those diagrams or maps (if any)?</p>	<p><b>30 Minutes</b></p> <p><i>Option</i>—Students look online and in other texts to find a range of diagrams. Students should consider the extent to which those maps indicate measurable phenomena and identify causal connections.</p>
<p><b>Class Activity 5.1. Choosing a Topic</b></p> <p>Choose a topic from a previous chapter or pick a new topic (related to the focus of your class) that you would like to better understand—homelessness, poverty, neighborhood revitalization, international health . . . whatever works for you and your class. You will construct maps on this topic later in this chapter.</p>	<p><b>10 Minutes</b></p> <p><i>Option</i>—Professor assigns topic(s).</p>



<b>Class Activity 5.2. Evaluating the Structure of a Map</b>	<b>30 Minutes</b>
<p>Using a map you made in a previous chapter, evaluate its logic structure and write the results on Handout 5.1.</p> <ul style="list-style-type: none"> <li>• Identify breadth</li> <li>• Identify transformative concepts</li> <li>• Calculate the depth</li> </ul> <p>Present the results to the class and discuss. What maps have greater breadth and depth?</p> <p>Where are the best/easiest opportunities to improve the structure of the maps?</p>	<p><i>Note</i>—Requires handout (available in the book and online).</p> <p><i>Option</i>—Students may use one, some, or all of the maps made in Chapter 2, 3, or 4. Alternatively, the professor may provide them with a pre-made map. Or students may find maps in a textbook or online (just make sure they are causal maps).</p> <p><i>Option</i>—Advanced students may also evaluate the map using tools from Appendix A.</p> <p><i>Option</i>—Professor creates a “four square” chart (e.g., Figure 5.6) on the blackboard (or high-tech equivalent) and plots the breadth and depth of each map on that chart (after or as the maps are presented by the students). This will help to graphically show the range of maps.</p> <p><i>Note</i>—The best opportunities for improving the breadth is to add concepts through additional primary or secondary research (although speculation is possible, it is less reliable). The best way to improve depth is to use primary and secondary research to identify additional causal connections between existing concepts <i>starting</i> with those concepts that have only one arrow pointing at them. This is because adding a second arrow will boost the concept to “transformative” status, indicating that it is better understood than others. Adding a first or third (or more) arrow may be useful, but not as useful as that second one.</p>

<b>Reflection/Discussion</b>	<b>20 Minutes</b>
<p>Look at the third Reflection/Discussion feature in Chapter 5, copied here.</p> <p>For each of the quadrants of breadth and depth, describe a real or hypothetical situation where a map in that quadrant might be useful. Look at the maps you created in previous chapters and see which quadrant from Figure 5.6 that they fit. Discuss general and specific ways you might improve your map in a way that shifts it to a better quadrant (more breadth and depth).</p>	<p><i>Note</i>—The process of improving the structure of maps is a very important part of this textbook. General approaches to improvement would be either increasing the number of concepts and/or causal connections between them through research. More specifically, students can suggest new concepts that could be added and/or identify specific causal connections that might be found through research.</p>

<b>Class Activity 5.3. Clustering and Categorizing</b>	<b>30 Minutes</b>
<ul style="list-style-type: none"> <li>• Consider the topic selected in Activity 5.1.</li> <li>• Working individually or in small groups, spend a few minutes brainstorming concepts related to your topic.</li> <li>• Write each concept in a separate circle (card or sticky note).</li> <li>• Arrange circles so that similar concepts are clustered closer together.</li> <li>• Discuss the similarities and differences between the concepts. Do some circles contain concepts that overlap with others? If so, talk about how they might (nor might not!) be categorized to make the map easier to read and more focused on the topic (see abstraction/categorization, below).</li> </ul>	<p><i>Note</i>—This is essentially a process of categorization or identifying themes from data. Only here, the concepts have been placed on a map that (in some ways) makes it easier to clump them together and consider their similarities for potential categorization.</p> <p><i>Option</i>—Students may use maps that they have developed in previous exercises, a map found online, or a map provided by the professor.</p>

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<b>Class Activity 5.4. Gap Analysis</b>	<b>30 Minutes +/-</b>
<p>Students work in small groups using the circles (concepts) created in the previous activity (written on 3 × 5 cards or sticky notes) connected with arrows to create a KM. You may also use the maps that you developed in previous chapters.</p> <p>Working in small groups, identify <i>blank</i> spaces on your map. Talk about what circles and arrows might be added to improve the structure of the map. For “bonus points” talk about your options for research (Chapter 3, Chapter 4, Appendix C).</p>	<p><i>Note</i>—This can be interesting for many and challenging for some. However, an important piece of the research puzzle is being able to ask the “right” questions. By focusing the direction of research on providing that “second arrow” pointing to a concept, researchers can more rapidly improve the structure (and so the effectiveness) of their maps.</p> <p><i>Option</i>—Use maps provided by the professor.</p>



## COLLABORATING WITH OTHER RESEARCHERS

Collaboration is increasingly important for understanding and resolving the big problems of the world. In this chapter, students learn about collaborating with other researchers.

*Key* here is exploring beyond one's immediate circle of friends and classmates to connect with researchers across the country and around the world.

Another *key* here (from a structural perspective) is the process of integration (synthesis) of maps as a path to improving the maps and increasing collaboration and successfully reaching goals.

Reflection/Discussion	30 Minutes
<p>Look at the Reflection/Discussion feature in Chapter 6, copied here.</p> <p>Reflect on your own or discuss as a group, what is one big problem that you see in the world?</p> <ul style="list-style-type: none"><li>• What fields and subfields of research know about that problem and solutions to it?</li><li>• What solutions might emerge from collaboration among those researchers to integrate their knowledge?</li></ul>	<p><i>Undergraduates</i>—Undergraduate students may not know about many fields, so they may benefit from a list of fields, or they may conduct some Internet searching (or review their institution's course offerings) to find out the names and foci of various fields.</p> <p><i>Note</i>—Use this as a place to talk about student research projects as an interdisciplinary collaboration. Do all students on a team come from the same field of study or have the same disciplinary assumptions? How might these assumptions affect the focus of the research? What difficulties might be encountered by bringing in experts/researchers with different backgrounds?</p>

Activity 6.1. Integrating Multiple Maps	45+ Minutes
<p>In this activity, students collaborate to integrate the maps you created in Class Activities in Chapters 4 and 5 (alternatively, you may use other maps).</p> <p>First, students work individually (or in small groups) to integrate the two maps. Next, students present the integrated maps to the class. Presenters should pay particular attention to the circles at the overlap between the maps. Explain how you chose those circles. Why do you believe that they are sufficiently similar to be counted as overlaps?</p> <p>The class then discusses the results, evaluates the work, and suggests improvements. Does the class agree with the choices of circles as overlaps? If not, what changes might be made?</p>	<p><i>Note</i>—The "overlap" is where two maps contain the same concept (they may have different wording, but the same "thing" should be measured for each).</p> <p><i>Note</i>—This approach is key for interdisciplinary collaboration, for integrating or synthesizing theories between disciplines.</p>

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<b>Activity 6.1. Integrating Multiple Maps</b>	<b>45+ Minutes</b>
<p>Finally, for each map, draw on the insights and tools found throughout this book (and developed during your class) to discuss evaluating and improving that map for practical application and resolving difficult problems. What additional improvements might be made (generally and specifically) by:</p> <ul style="list-style-type: none"><li>• Involving more stakeholder groups (Chapter 2)</li><li>• Integrating additional theories (Chapter 3)</li><li>• Conducting your own research (Chapter 4)</li><li>• Improving structure (Chapter 5)</li><li>• Integrating expert understanding (Chapter 6)</li></ul>	



# COMMUNICATION, COLLABORATION, AND ACTION

This chapter is for students to learn some basics of presenting their maps—both online and in person. This chapter also covers how to use maps to support collaboration among stakeholders as they work toward common and/or interrelated goals.

*Key* to this chapter is helping clients to “read” their knowledge maps in order to support more effective decision-making and greater success in reaching their goals.

<b>Class Activity 7.1. Creating an Online Map</b>	<b>45 Minutes +</b>
<p>Review the <i>Sample Data of the PAC-Involved Evaluation Report</i> in the nearby box. Working in teams of two or three, find concepts and causal connections in the report text.</p> <p>Next, following our example in the above “test-drive,” complete the Elements worksheet and the Connections worksheet on the Handout for Class Activity 7.1, with information about each concept and causal relationship you find.</p> <p>In the Elements worksheet, enter the name of each concept in the Label column.</p> <p>In the Connections worksheet, enter each causal relationship, one row per causal arrow:</p> <ul style="list-style-type: none"><li>• In the From column, enter the concept (from your Elements worksheet) that the arrow is pointing away from.</li><li>• In the To column, enter the concept (from your Elements worksheet) that the arrow is pointing to.</li><li>• In the Type column, enter “+” (or “Causes more”), if more of the first concept causes more of the second concept. Enter “-” (or “Causes less”), if more of the first concept causes less of the second concept. Enter “?” for any causal relationships that are uncertain or mixed.</li><li>• In the Description column, enter the supporting data for the causal relationship.</li><li>• In each of the five rightmost columns, enter “1” in the column for each data source that supports the causal connection. Then, enter the total number of data sources for the causal connection in the # data sources column.</li></ul> <p>Compare and discuss your understandings.</p> <p>If you wish, create an account in Kumu and upload your completed handout to instantly create a map. Then format your map if you wish to fit your artistic inclinations.</p>	<p><i>Note</i>—This is an exercise to give students practice creating spreadsheets and moving their data to an online platform. Specifically, Kumu (which we’ve found to be useful for making maps and presentations).</p> <p><i>Note</i>—For undergraduate students, you may want to check their progress at each step. For advanced students, this may be assigned as homework.</p> <p><i>Option</i>— Professor provides alternative report (should be short).</p> <p><i>Option</i>—Require each student to create a map using one of the online platforms described in the book or found in the previous exercise.</p>

Bonus Activity (not in book)	Homework
<p>Students go online to find interesting/useful sites for creating and presenting maps. Identify strengths and weakness of the platform, create a map, and present their findings to the whole class.</p> <p>For a few examples of platforms, see the Further Exploration section at the end of the chapter. There are many more out there!</p>	<p><i>Option</i>—Students may work individually or in small groups.</p> <p><i>Note</i>—Some sites are easier to use than others. However, more effort may pay off with better presentations.</p>

Bonus Activity (not in book)	Homework
<p>Students use the maps they've made in previous chapters to create a map using one or more online platforms.</p>	<p>This could be done in class or assigned as homework.</p>

Bonus Activity (not in book)	10 Minutes Per Presentation
<p>Provide time after each presentation for the class to suggest improvements in the team's presentation techniques.</p>	<p><i>Note</i>—Good opportunity to talk about presentation skills.</p>

Bonus Activity (not in book)	30 to 60 Minutes
<p>Working in small groups, one student serves as facilitator while other students act as representatives of stakeholder groups.</p> <p>Each group reviews a map and conducts a "mock" action planning exercise.</p> <p>One student (possibly the acting facilitator) records their planned actions, goals, opportunities for additional research, and tracking results with KPIs.</p> <p>Afterward, the group presents their planned actions to the class as a whole, explaining how they arrived at their decisions based on the map.</p>	<p><i>Option</i>—Before students begin their activity, it may be useful for the professor to facilitate a brief example for the class as a whole. If so, be sure to draw student attention to "actionable" concepts and compare those with concepts which are not actionable—and so require additional "back-mapping."</p>

# APPENDIX A

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This appendix is a collection of tools and techniques for creating, interpreting, and applying knowledge maps.

*Option*—Students as individuals or small groups may be assigned to learn one or more techniques, use them to analyze one or more maps that they have created during the class, and present their results, experiences, and learnings to the whole class.

## APPENDIX B

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This appendix provides a sample report.

*Option*—Students may use this format for their final paper.

*Option*—Students use a more traditional format for their papers.



# FURTHER EXPLORATION

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## TALKING IN CLASS

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Throughout the book, we use terms like “discuss,” “talk,” and “converse.” You may want to go further by introducing and practicing techniques of “dialog.” For more information, see

<https://thesystemsthinker.com/the-process-of-dialogue-creating-effective-communication/>

[https://www.aacu.org/liberaleducation/2017/summer-fall/maxwell\\_gurin](https://www.aacu.org/liberaleducation/2017/summer-fall/maxwell_gurin)

[https://www.unbc.ca/sites/default/files/assets/centre\\_for\\_teaching\\_and\\_learning/tips/creating\\_dialogue.pdf](https://www.unbc.ca/sites/default/files/assets/centre_for_teaching_and_learning/tips/creating_dialogue.pdf)

## CLASSROOM MAPPING

While this book and teacher’s guide have provided an effective exploration into mapping, you may want to use a “light” approach to mapping for your other classes. A pioneer in this area is Dr. Sonia Goltz of Michigan Technological University. Dr. Goltz has been using ASK MATT in the classroom to both support and evaluate student learning.

Goltz, S. M. (2017). Enhancing simulation learning with team mental model mapping. *Management Teaching Review*, 2(3), 211–224.

Working in teams of four or five, students had previously used an online simulation to identify problems, choose solutions, and allocate resources as if they were managers of a human resources department in a large organization. She was concerned, however, because although many computer simulations are engaging, students may have become focused on the “fun” side of the simulation. They may also become focused on the “competition” aspect—that is, trying to “win” against the simulation (and/or other students) rather than learning the tools for their usefulness in the real world.

In contrast, mapping helps students to think deeply about the course material, leading them to “display higher levels of cognitive complexity.”

After completing two of the ten modules for the simulation, each team created a knowledge map using ASK MATT. Working only from memory, the teams were allowed 40 minutes. Dr. Goltz took pictures of the maps to evaluate student progress, and students were encouraged to take pictures to use for their final papers. The mapping process requires students to carefully consider each part of the map—itsself a learning experience—while using their memories, imaginations, and cognitive abilities to create their maps. At the end of the course, the student teams create another map. The second map is typically more complex than the first, reflecting increased student understanding.

## SYSTEMS THINKING

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The approach to causal knowledge mapping presented in this book is based on insights from systems thinking. If you would like to delve into that area, here are a few good resources to get you started:

Two hours of audio and related slides providing an introduction to systems thinking:

<http://coevolving.com/blogs/index.php/archive/intellectual-virtues-architectural-programming-agile-delivery-and-action-research/>

A map of systems thinking with lots of places to explore:

<https://kumu.io/stw/systems-thinking#introduction/cover>

Sources here include a 25-minute presentation and PowerPoint file on the history of cybernetics: [https://www2.gwu.edu/~asc/slideshow/cybernetics\\_web/slideshow.html](https://www2.gwu.edu/~asc/slideshow/cybernetics_web/slideshow.html)

In-depth, six-day course on systems thinking: <http://coevolving.com/blogs/index.php/archive/eight-infographics-on-systems-methods-utoronto-ischool-2018/>

Tips for using systems thinking in the classroom—from kindergarten on up:

<https://teacher-blog.education.com/how-to-practice-systems-thinking-in-the-classroom-9cbfa3dcd2cf>

Classroom activities on sustainability:

<https://sites.duke.edu/trillium/files/2015/01/Sustainability-Systems-Thinking-general.pdf>

<https://pdfs.semanticscholar.org/3436/c52688ab6dae545fdb783bb0b88b8b052c16.pdf>

A range of resources and insights from Peter Senge and beyond:

<http://donellameadows.org/systems-thinking-resources/>