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Thinking Like a Research Expert: Schemata for Teaching Complex Problem-Solving Skills

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The difference between expert and novice problem solvers is that experts have organized their thinking into schemata or mental constructs to both see and solve problems. This article demonstrates why schemata are important, arguing that they need to be made explicit in the classroom. It illustrates the use of schemata to understand and categorize complex research problems, map the terrain of legal research resources, match appropriate resources to types of problems, and work through the legal research process. The article concludes by calling upon librarians and research instructors to produce additional schemata and develop a common hierarchical taxonomy of skills, a "Bloom's Taxonomy," which would define legal research problem-solving skills more precisely and set benchmarks for assessment.

KEYWORDS legal research, pedagogy, problem-solving, schemeta, conceptual framework

"We do not first see, and then define. We define first, and then see."
—Walter Lippman[1]

One critical difference between experts and novices as they approach problems is that, "[E]xperts notice features and meaningful patterns of information that are not noticed by novices."[2] Experts see what novices do not, both in the problem and in the resources available. The knowledge of experts is also highly organized and easily retrievable for application.[3] Schemata are

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the key to expert problem solving. Schemata are "organized representations of things or events that guide a person's thoughts and actions."[4]

For law students to acquire complex problem-solving skills, they must build schemata sufficient to the task. This paper illustrates the relationship of schemata to problem solving and presents a complex problem with a succession of schemata necessary for its resolution.

PROBLEM-SOLVING SCHEMATA

To illustrate how schemata help solve problems, consider the task of finding Ursa Major, a constellation in the night sky, demonstrated in Figure 1.

The problem for law librarians as instructors of legal research is that we forget what it is like not to know the schemata—what it is like not to be able to see Ursa Major as the Big Dipper. There is no going back. The challenge is to find what is implicit in expert legal research that needs to be made explicit. To this end, the definition of schemata, such as the outline of the Big Dipper (see Figure 2), is essential to making the invisible visible to our students. As noted above, "We do not first see, and then define. We define first, and then see."[5]

FIGURE 1 The task of finding Ursa Major in the night sky becomes easier once we know that Ursa Major is the "Big Dipper."

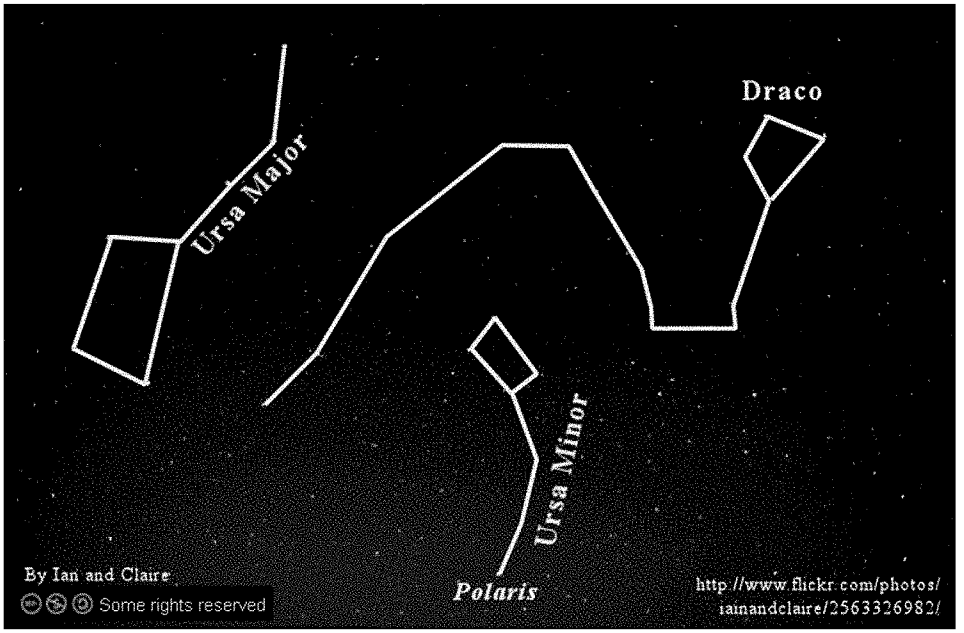

FIGURE 2 The same is true of Draco, Ursa Minor, and other constellations. We cannot navigate the night sky without these schemata.

A COMPLEX PROBLEM

To illustrate the importance of schemata, consider a complex problem as presented in Figure 3—the kind that makes students respond with a "deer in the headlights" expression and that leads to a lot of "wheel spinning."

Although carefully stated using terms of art, this is a challenging problem, similar to what I sometimes dealt with in practice. Hypothetically, the problem has been stated by a senior attorney who knows a lot about pension plans, so the researcher has the advantage of technical vocabulary being used "from the get go." Also the senior attorney has a fairly clear idea of what she wants; if the associate will just pay attention, a number of important clues present themselves.

SCHEMATA FOR SEEING THE PROBLEM

Apollo 13 and 'Working the Problem'[6]

"Houston, we have a problem" harbingered one of the most important rescues of the last century—the near-fatal disaster aboard Apollo 13. In the

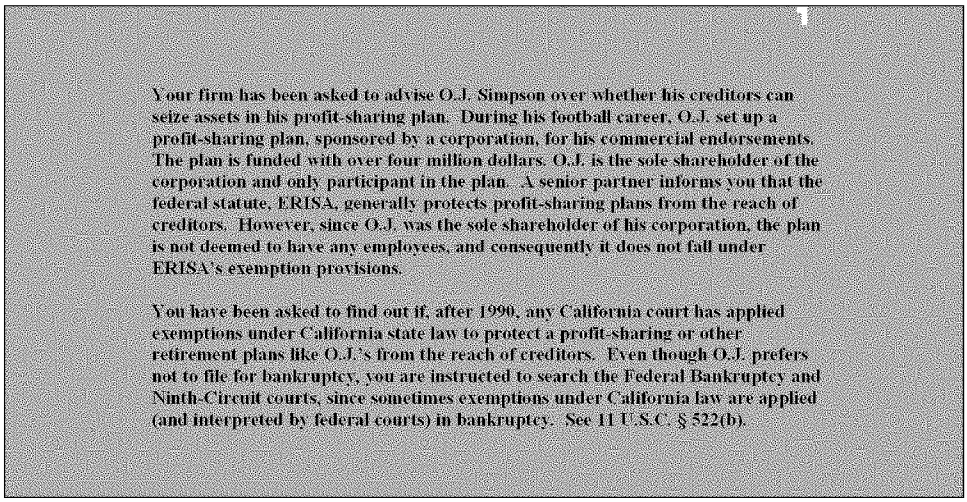

FIGURE 3 Find the key terms.

movie Apollo 13, NASA flight director Gene Krantz must bring order to the scientists and engineers in the Houston Flight Center who are reacting to a flood of negative information about Apollo 13.[7] As portrayed by Ed Harris, Gene Krantz demands that his staff "work the problem" and avoid simply guessing.

The Apollo 13 crisis parallels the initial reaction of new attorneys and law clerks when presented with legal research problems. Reacting to panic, the researcher trips over herself in an effort to foresee an immediate solution. The important lesson to draw from Apollo 13 is to work the problem, not the solution. To do that, the researcher must first find out everything there is to know about the problem. After this initial step, she can match the problem to appropriate strategies and resources for an expedient solution.

Back to Middle School English—Who, What, Where, When, Why, and How

"Working the problem" is something like learning to conduct a good reference interview or completing a writing assignment in middle school. A heuristic model, such as a checklist, can be helpful, but the most important task is to think through the problem and learn as much about it as possible. Medical doctors are taught to do this; vital signs are called out as a patient is wheeled into an emergency room. Law students must also be taught this skill.

Table 1 breaks down the analytic elements of a typical research problem a new attorney may encounter as part of client interview or as part

TABLE 1 "Working the Problem" Schema

What you need to know	Sample questions
	Who?
Parties	Who are we representing (i.e., which side of the issue are we on–buyer or seller, plaintiff or defendant, etc.)? What legal entities are involved (any trusts, corporations, partnerships, etc.)?
	What?
Descriptive Words of Facts or Terms of Art	Besides the term "profit-sharing plan," are there other terms I should be using, like "pension" or "retirement"? I'm not sure if I understand the difference or if it matters. How else might a "sole shareholder" be described in the literature?
Descriptive Words of Legal Issues	Do you think that the best subject heading to describe the problem is "exemptions from creditors"?
Specific Sources to be Used	For my research on retirement plans and exemptions from creditors, is there any specific treatise or looseleaf service I should consult in addition to CCH's Pension Plan Guide?
	Where?
Applicable Jurisdictions	Do you want me to research federal bankruptcy law as well as California debtor-creditor law? Do you want me to confine my federal research to California? Are you interested in any other states? Are there any choice-of-law issues?
	When?
Time Periods	What time periods do you want me to research? Are the last two years sufficient? Does the time period (day, night, season, etc.) of any of the events in the case matter?
Time Deadlines/Priority	Do you want a quick answer or exhaustive research? If I complete this by Tuesday morning, is that OK?
	Why?
Objective	What are we trying to accomplish with this memo, brief, motion, contract, etc.? How do we want this to come out?
	How?
Precision/Recall[8]	Do you want all of the relevant journal articles or just the best article on the topic? Do you want all of the cases dealing with retirement plans in debtor-creditor law or just two or three cases that bear the closest relationship to the issue?
Billable Time/Costs	How long should this take me? Are billable hours limited? May I use Lexis and/or Westlaw? Which parts of the research, if any, would you do online? Do you want me to try and use free sources for my research? Has anyone ever done similar research on the topic that I should know about?
Presentations of Results and Reporting Back	How do you want me to present my results? Do you just want printouts marked with highlighter or a full memo? Should I check back with my initial results before proceeding any further?

of an assignment from a supervising attorney. For librarians, this may be recognizable as a reference interview, adapted for use in a law firm setting.

Considering the O.J. Simpson hypothetical in Figure 3, the task is to extract the terms that will lead to an understanding of the issue and ultimately the answer and relevant authority on the issue.

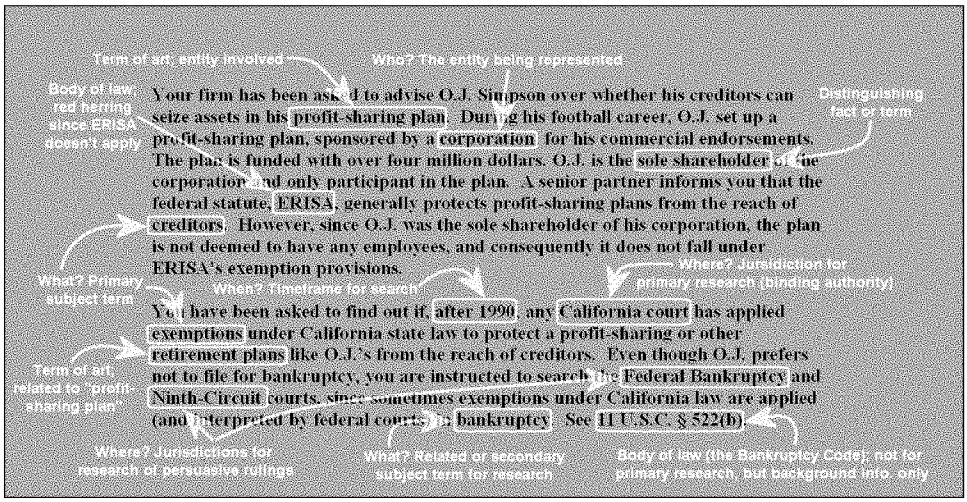

FIGURE 4 Illustration of key terms.

In the problem, as illustrated in Figure 4, the general subject area is the intersection of qualified retirement plans (or "profit-sharing plans") and debtor-creditor law. A possible start would be to use some index to either look up "creditor" under "profit-sharing plans" or inversely, "profit sharing" under "creditor." The issue involves the subject of "exemptions," which is generally a subtopic of debtor-creditor law. The narrow issue is the application of exceptions to "single person plans," which is a term of art used by practitioners, but often not found in indexes. If no such entry exists or a search for items using such terms bears no fruit, then I would search using combinations of "sole," "single," and "only" with "shareholder" and "stockholder." Finally, the research should only concern cases after 1990 in California state courts and in the Ninth Circuit (but limited to California cases).

What Kind of Problem Is It?

In library school, I had a marvelous teacher who gave me a schema for looking at types of problems related to government documents. While I immediately realized that the table could be readily adapted for legal research, the greater revelation was that while not all problems were alike, they could be grouped into types with certain types of problems requiring specific, yet different, strategies and resources for resolution. For instance, one of my first research problems in practice was, "What is the average age of retirement for female obstetricians/gynecologists in the Los Angeles area?" I was totally unnerved by the problem because it was of a type I had never encountered. Fundamentally, statistical problems require different strategies

TABLE 2 Problem Typing

Search type	Used for	Example
Known Item	You already know the citation, case name, name of an act, or have a very specific fact pattern to research.	I need *Roe v. Wade*. I need any California or Ninth Circuit case involving exemptions from creditors and the debtor's interest in a retirement plan that falls outside of the Employee Retirement Income Security Act's (ERISA) anti-alienation provisions, because it is sponsored by a corporation with one shareholder and no employees other than the shareholder.
Subject	You are not looking for a specific item but for information on a particular subject.	I am looking for something explaining ERISA generally, including what kind of retirement plans it covers. I need to understand exemptions from creditors in California.
Institutional	You know what you are looking for will be found at a particular institution, agency, or organization, or you want to find out what agency administers a particular program or enforces a particular law.	I need Department of Justice Rulings and Opinion Letters on when the merger of two large medical groups falls within the safe harbor provisions for antitrust issues. I need any Department of Labor rulings regarding the anti-alienation provisions of ERISA.
Statistical	You need statistical information from a government or other trustworthy source.	I need to know the percentage of children living below the poverty level in Los Angeles.
Special Techniques	You are searching for materials that require special interpretive or interdisciplinary skills.	I need legislative history and current legislation and regulatory action; budget, patent, census, and historical materials; government documents; international and foreign law; tax forms and IRS materials; scientific and technical reports; public records; or competitive business intelligence. I need the legislative history of the ERISA anti-alienation provisions.
News	You are searching for news stories.	I need accounts of the lawsuit in France by a humanitarian group against Yahoo!
Reference	You need basic background or definitional information.	I need to know the etymology of "escrow." I don't even know what "ERISA" is.

and resources to solve than do questions about the rule against perpetuities in North Dakota.

Table 2 was developed by my former Government Documents instructor from library school; I have modified it for legal research.[9]

Returning to the O.J. Simpson problem in Figure 3, even after having "worked" the problem with a "who, what, why, where, when, how" analysis (see Table 1), the researcher is not ready to start until she has figured out what kind of problem or problems she has on her hands. However, before suggesting problem types and matching them to resources, we need to map the terrain of resources.

SCHEMATA FOR UNDERSTANDING RESOURCES—CONCEPTUALLY MAPPING THE TERRAIN OF LEGAL RESOURCES

Like problem types, legal resources fall into different classes that can be organized in different ways. Two of the most common ways of arranging them are based on the distinction between primary and secondary and by chronology, subject, and citation.

Mapping Primary and Secondary Resources

Hopefully, students learn the distinction between primary and secondary resources during their first year. Because of the heavy focus during the first year on official or "flagship" primary resources (like the United States Code and United States Code Annotated), what is often more difficult to grasp is the appropriate use of combined primary and secondary resources. Table 3 illustrates a schema to help students arrange or map resources in relation to primary and secondary authority and their respective uses.

As a practicing attorney for nine years in the areas of tax, retirement plans, transactional law, and estate planning, combined resources of primary and secondary materials, such as the CCH Standard Federal Tax Reporter, dominated my research. The ability to jump between the Internal Revenue Service (IRS) code, regulations, commentary, and annotations was essential to understanding the law and efficiently researching complex problems. I suspect that for many attorneys, regardless of their area of expertise, secondary and combined resources dominate their research. Most questions are of a subject type, and so secondary and combined resources become more important than the use of the primary materials, which are often emphasized in firstyear legal research and writing.

The Wren Matrix

In 1986, Christopher G. Wren and Jill Robinson Wren introduced a matrix showing how all three branches of government had reporters or codes that were published in both chronological and topical formats.[11] Table 4 illustrates the Wrens' schema, but adding a new column for arrangements based upon citation.

TABLE 3 Primary and Secondary Authority

Type of resource	General examples	Binding upon	Used for
Primary	Constitutions	All branches of government.	Known item and institutional searches where you need binding authority.
	Codes and Session Laws (Statutes at Large)	Except as found unconstitutional, all branches of government.	
	Court Decision Reporters, Case Digests and *Words and Phrases* (1940-)[10]	Binding upon lower courts of the same jurisdiction and other branches of government.	
	Codified Regulations or Administrative Codes and Administrative Registers or Regulations	Legislative regulations (i.e., when Congress has delegated legislative rulemaking to an agency) may be binding upon the issuing agency and the general public.	
		Interpretive regulations (i.e., issued to provide guidance of an agency's position on an issue or to clear up ambiguity) may hold an agency and the public bound to a particular interpretation of legislation to the extent courts do not disagree.	
	Administrative Agency Opinions and Rulings	Generally binding upon the agency. Sometimes, may only be binding upon the agency with respect to the parties in question.	
Secondary	Encyclopedias (e.g., *American Jurisprudence* (2d ed. 1961-))	Not binding.	Subject, statistical and special experience searches where you need to understand the issues and background of an area of law or problem. Also use to confirm your interpretation of a primary source.
	Treatises and Hornbooks (e.g. Ronald D. Rotunda & John E. Nowak, *Treatise on Constitutional Law: Substance and Procedure* (4th ed. 2007) and David G. Owen, *Products Liability Law* (2d ed. 2008))		
	Law Reviews (e.g., articles reviewing particular areas of the law, such as Meredith L. Taylor, *North Carolina's Recognition of Tort Liability for the Intentional Infliction of Emotional Distress During Marriage,* 32 Wake Forest L. Rev. 1261(1997))		
	Professional & Bar Journals (e.g., Paul D. Callister, *Charitable Remainder Trusts: An Overview*, 51 TAX LAWYER 549 (1998))		
	Form Books (e.g., Jacob Rabkin and Mark H. Johnson, Current Legal Forms, with Tax Analysis (1948-))		
Combined	Looseleafs (e.g., CCH Standard Federal Tax Reporter (1913-))	Only primary sources have any binding authority.	Use when ease is important. Looseleafs combine statutes, regulations, commentary, and case law annotations in a topical arrangement with a good table of contents and indexing system.
	News Services (e.g., BNA, U.S. Law Week (1933-))		
	American Law Reports (6th ed. 2006)		

TABLE 4 Arrangement of Primary Sources

		How the law is published (Arrangements)		
Institution	Kind of law	Chronologically	Topically	By citation
Legislature	Statutory Law	Session Laws	Statutory Codes	Shepard's, KeyCite, Annotated Codes
Courts	Case Law	Case Reports	Case Digests (summaries of primary authority)	Shepard's, KeyCite, ALR
Agencies and Executive Branch	Administrative Law	Administrative Registers or Regulations	Administrative Codes	Shepard's, KeyCite, Annotated Codes

Going beyond the Wren's schema, I have added a column suggesting that the law is also organized by citations. Shepard's, KeyCite, code annotations, and American Law Reports (ALR) organize the law into "streams of precedent"[12] for cases and place codes within the context of their interpretation by courts and other statutes or regulatory materials. They allow researchers to see the law, not as a single case or statute, but as it evolves through time and interacts with other law around it. A former colleague of mine, Peter Hook, once suggested that the table could also be expanded to add a column for the "making" of the law: legislative history documents, briefs, tables of authority,[13] hearing transcripts, motions, and pleadings, regulatory rule-making and agency decisions, executive orders, etc. Conspicuously missing from the arrangement is a row for constitutions and corresponding documents. Furthermore, international treaties and conventions might also be added as a row to the table. The point is to start with a simple schema and add on new resources and explain where they would fit. For example, the Digest of Decisions of the Federal Labor Relations Authority comes from the administrative branch and is topically arranged; it would find its place in the box with administrative codes.[14]

Intermediation Versus Disintermediation—The Final Dimension of Legal Research

Having divided the universe of resources into primary versus secondary and chronological versus topical arrangements, it is time to introduce the distinction that has profoundly impacted legal research—print versus electronic—and promptly denounce it as an inadequate distinction for failing to address the more important phenomenon of disintermediation and the collapse of hierarchical authority. A better way to describe the dichotomy is between human-intermediated indexes and disintermediated computer algorithms, such as free-text searching (whether incorporating Boolean terms and connectors or relevancy-ranked natural language algorithms).[15] Google and

Yahoo! illustrate this distinction. Google's natural language search mechanism works through a computer algorithm producing relevancy-ranked search results. In contrast, Yahoo! (which stands for "Yet Another Hierarchical Officious Oracle")[16] finds information based upon a hierarchical taxonomy classifying links intermediated by human beings. Web site operators submit links to Yahoo! Directory with category suggestions, and Yahoo! editors review the submission before linking the suggested site into the Yahoo! hierarchy.[17] Other current Web examples of intermediated systems are Wikipedia[18] and Delicious[19] where users vet and submit entries. In some ways, these systems might be described as user mediated, rather than expert intermediated (although the relative expertise of the content contributors of such systems is open to debate).[20]

The critical distinction for students to understand is between intermediation and disintermediation. In most instances, that distinction aligns with whether the service includes a controlled vocabulary index designed by human beings or whether access is provided via computer search algorithms of full text. Pedagogically, grounding the instruction in the difference between print and electronic promotes an underdeveloped schema for understanding the terrain of resources and hampers modeling how to match resources to problem types.

SCHEMATA FOR MATCHING PROBLEMS TO RESOURCES

Mapping Octants for Known Item and Subject Searches

In Figure 5 below, the terrain of research resources has been divided into octants. First, quadrants are formed by axes of primary versus secondary authority and chronological versus subject arrangement. Next, octants are formed by dividing the quadrants with the addition of a third axis—human-mediated controlled vocabulary indexes versus disintermediated computer algorithms. Most resources can be placed into this schema. The shaded areas illustrate the starting points for "known item" and "subject" searches, as previously defined in above. I have also posted an interactive schema that gives examples of resources in each of the research octants on the Web.[21]

To illustrate the schema's use, consider the O.J. Simpson problem. The researcher has been asked to find any cases in California courts or in the Ninth Circuit that have applied state law exemptions to prevent creditors from reaching the assets held in profit-sharing plans that do not fall under the anti-alienation protections of the Employee Retirement Income Security Act (ERISA; because they have single shareholder owners and technically no employees). These facts and issues are very narrow and particular. While the researcher does not know if such a case exists, this research question is a "known item" problem because a case with such a pattern of facts and issues may actually exist and therefore can be located and "known." If not,

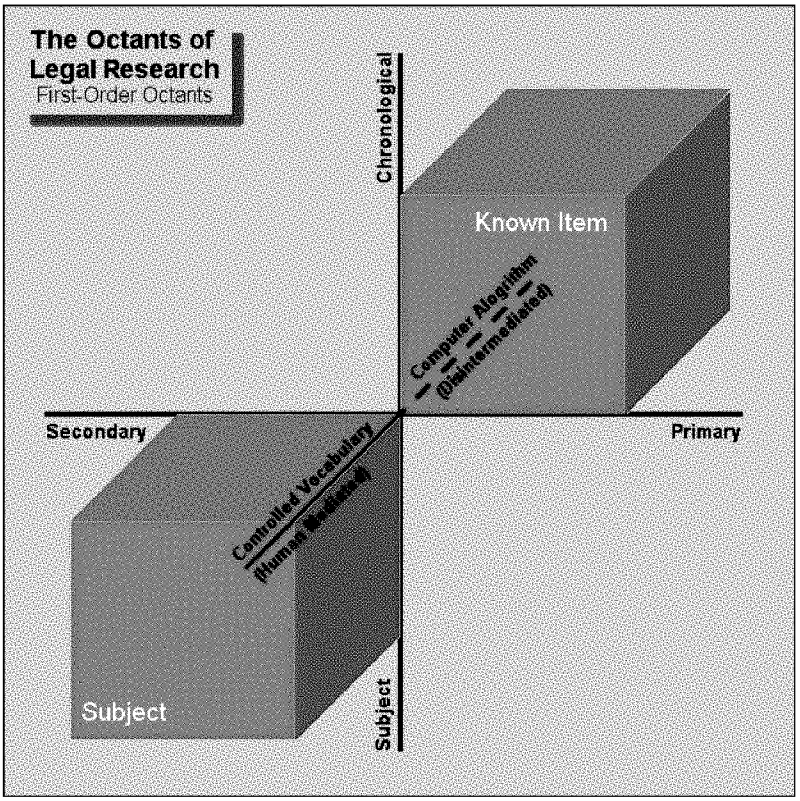

FIGURE 5 Legal research octants.

the researcher will have to broaden his or her search, including looking for an analogous situation, or move on to a subject search.

Per the octant schema in Figure 5, the researcher should probably start by searching the CA Federal & State Cases, Combined on Lexis (or similar database on Westlaw),[22] which is a primary, chronological, and algorithmic resource. A detailed terms-and-connectors search can be structured using the key terms identified in Figure 4 above:

((Creditor or Debtor)/p Exemption) & ("Profit-Sharing Plan" or "Retirement Plan") & ((Sole or Single or Only)/2 (Shareholder or Stockholder)) & (Date > 12/31/1990)

In this instance, the Lexis search retrieves eleven cases. Lexis' overview for the first case, *In re* Stern, reads:

> The appellate court found that the district court properly determined that the plan was not ERISA qualified at the time of the bankruptcy filing and thus, the plan's assets were not exempt from the bankruptcy estate by

> virtue of ERISA qualification. But, when the debtor's bankruptcy petition was filed, the assets rested in the plan which enjoyed an exempt status under California law. Also, the mere fact that the debtor converted nonexempt assets into exempt assets was insufficient to prove a fraudulent transfer. Thus, the district court properly held that the transfer of assets from the individual retirement account to the plan was not fraudulent.[23]

This case is directly on point. Seven other cases of the eleven are also relevant and within the appropriate jurisdictions.[24] The researcher has quickly found a starting point for further research.

Prior to conducting a known item search for specific cases, the same researcher might feel that she needs some background information on profit-sharing plans, bankruptcy,[25] debtor-creditor law, and, if available, the intersection of all three (the last of which might be impossible to find). These are subject problem types, and, per the chart in figure 5, the researcher should use secondary (non-"authoritative") resources, arranged by subject, intermediated by human indexers or catalogers. For instance, the researcher might go to Aspen's Pension Answer Book (a handbook with quick answers to pension questions and an overview of pension law),[26] the multivolume Collier on Bankruptcy, or California Jurisprudence (for background on exemptions under bankruptcy or debtor-creditor law). After perusing the Pension Answer Book, the researcher might go to a combined primary and secondary resource, such as the CCH Pension Plan Guide, accessing pertinent subjects by the index ("Bankruptcy ... exemptions ... failure to establish an ERISA plan)."[27]

Because the goal is to learn to use intermediated resources, instructors should not be concerned whether the students use these secondary, subject resources online or in print, provided that the online databases include usable indexes and tables of contents (that can be "drilled down").

In the above example, orienting the research toward a "subject" problem type does not retrieve resources that have dealt with the specificity required to answer the questions about retirement plans not falling under ERISA, but which still might be exempt from the reach of creditors; however, it does produce some important background for understanding the overall problem. In contrast, a known item search retrieved cases exactly on point. Consequently, understanding methodologies appropriate for each of the problem types is critical to the solution of this complex problem.

What about resources in the other six octants? There are resources that can be placed into each of these quadrants. They have their uses, as will be discussed below, but not in the initial stages of research with the only exception being for statutory law. Most of the time, the code (a topical arrangement of the law) is cited, rather than the chronological arrangement. Consequently, many known item problems referring to a statute may require searching the code, rather than the Statutes at Large or state session laws.

On the other hand, sometimes what is presented in the problem is the name of an act, such as ERISA, or a recently enacted bill. Answering this type of problem typically requires access through a "Popular Name" table for statutes (available in print and on Lexis and Westlaw), or on the Web through a free-text search of Thomas (using the name of a recently enacted bill).[28] Indeed, when codified, the text of many acts is separated and scattered throughout the code, and it is often easiest to read a statute in its chronological form in the Statutes at Large or state session laws.

In sum, the octants schema is really designed to help researchers separate those resources that should be used first from those that will be used later in the research cycle.

The Research Cycle

The uses of other octants in Figure 5 become more apparent in consideration of the larger research cycle.

Find the Most Relevant Documents

In Figure 6, the researcher starts at the top of the schema with "Finding the Most Relevant Documents" and then proceeds through each of the steps

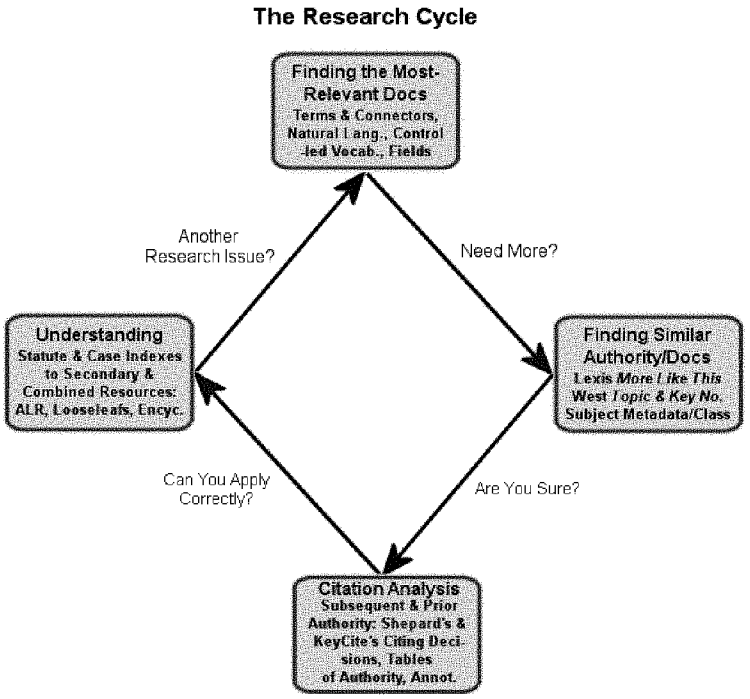

FIGURE 6 The research cycle.

until returning to the beginning, perhaps starting again with a new research issue. The first step in any research project, after "working the problem" and determining its type, is not to find everything on point—a common mistake among the uninitiated—but to find the most relevant document (or documents) on point. By moving quickly and rejecting items, even if tangentially related but not directly on point, the researcher can then go on to finding everything else she needs.

To illustrate "Finding the Most Relevant Document" in the O.J. Simpson problem, I used a "known item" methodology and constructed a term-and-connector search, limited by a date field, to attempt to find the most relevant cases on point in the Lexis CA Federal & State Cases, Combined.[29] Eight of my eleven cases were on point and within the relevant California and Federal jurisdictions. If I look at Lexis' Headnote 2 for *In re* Cheng,[30] the fifth case on point, it discusses the application of a specific statute, California Code of Civil Procedure § 704.115, which exempts assets of a profit-sharing plan from the reach of creditors in bankruptcy.[31]

Finding Similar Authority

Next I proceed to the step of the cycle of "Finding Similar Authority"—in this instance, other similar cases. I follow the hyperlink reading "More Like This" on the top navigation bar.[32] As seen in Figure 7, I use the "core terms" suggested by Lexis' natural language index and run my search in California Federal and State Cases, Combined.

The search retrieves one hundred cases because a relevancy ranked algorithm is used, but the most relevant cases should be on top, and indeed, the first case after *In re* Chang, which is its own best match, is *In re* Witwer.[33] In this decision, the Bankruptcy Court exempts profit-sharing assets from creditors under the same statute, California Code Civil Procedure § 704.115.

In Westlaw, finding similar cases can be done by searching for similar cases using the head note, Topic and Key Numbers at the beginning of the decision. By clicking on Key Number 163k49 k (Pension and Retirement Funds and Accounts), and then by using the search interface in Figure 8, I then can run a search in State and Federal Cases, California and find all similar cases as classified by West editors.[34]

Having found similar cases, it is now time to do citation analysis to check the status of the case law.

Citation Analysis

Citation analysis will also help find other relevant cases. With respect to Lexis and Westlaw, it is important to consider not only subsequent cases and history which may cast doubt on whether the original case is still good law,

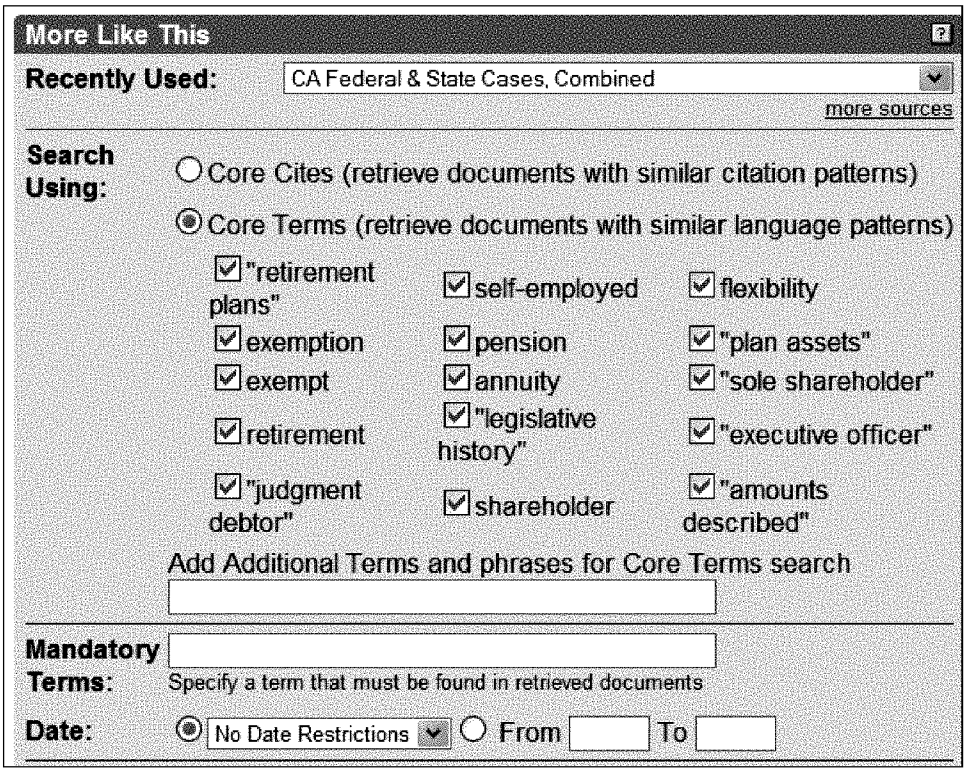

FIGURE 7 Lexis "More Like This" search.

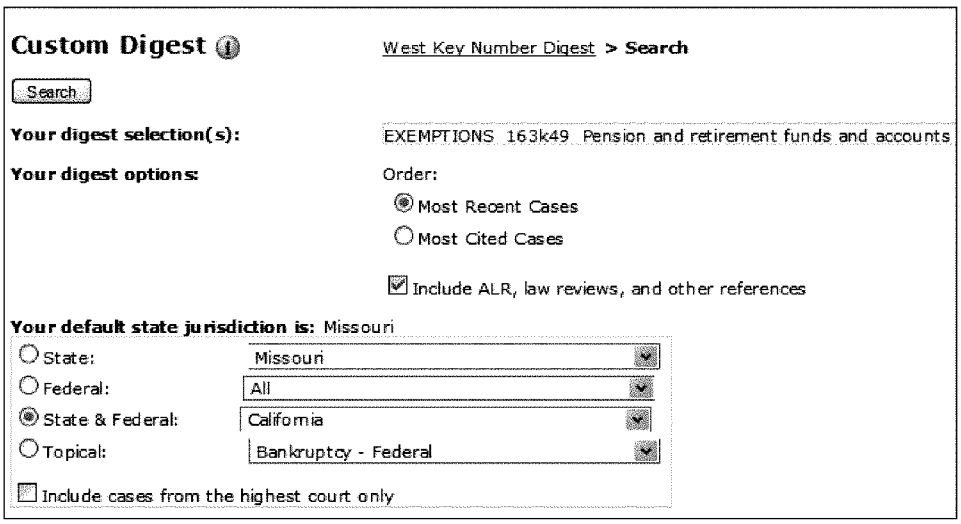

FIGURE 8 West key number search for similar cases.

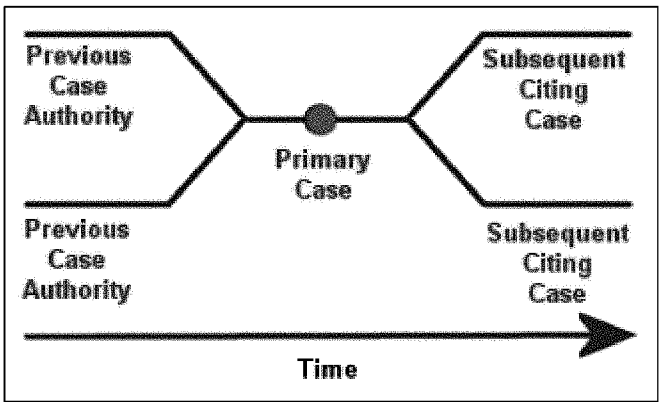

FIGURE 9 The stream of precedent.

but whether the foundation of precedent that the original case is built upon is also good law. The higher level concept for students is that cases exist in a stream of precedent through time (see Figure 9), and this stream has to be checked and understood, rather than simply checking a single case. Finally, it is worth emphasizing the role that citators and annotations can play in determining the status of statutes, such as the California statute providing exemption from creditors.[35]

Understanding

As a tax attorney, one of the important lessons I had to learn is that finding and reading the relevant statute usually did not lead to immediate understanding or resolution of the problem. Moreover, I usually found it difficult to place the statute into context. What case, regulation, Revenue Ruling, or other code section, perhaps a thousand sections away, might bear upon the statute? I quickly learned to put tax code sections into context and understand them by utilizing the CCH Standard Federal Tax Reporter,[36] a combined resource that includes the U.S. tax code, its legislative history, implementing regulations, analysis, and commentary (known as "CCH explanations"), and indexed annotations. By linking the code to commentary, I was able to find my way to an understanding of the code, issues involved, and resolution of my research problem.

The lesson I learned with the tax code applies to almost any primary material. How does a researcher make sure that his or her understanding of a particular case, code section, regulation, or statute comports with that of other attorneys and judges? For California, the researcher could look up the applicable case, *In re* Stern[37] in the "Table of Cases" for California Jurisprudence, and see what, if anything, has been said by commentators

about it. Likewise, the researcher can look up California Code of Civil Procedure § 704.115 in the "Table of Statutes."[38] Similar research can be done for federal cases in *American Jurisprudence or Corpus Juris Secundum*. If the case is cited or, better yet, annotated in *American Law Reports (ALR)*, there may be a wealth of information leading to understanding the case. If the case is annotated, a researcher would be foolish to ignore what *ALR* has to say about the case (since it is a collection of "slices of the law," based upon most-representative cases). Using citation analysis with Lexis and Westlaw, law reviews, treatises, and other materials can be quickly located to help with understanding statutes, regulations, cases, constitutions, and other primary sources.

CONCLUSION

Experts think differently than novices. By using schemata, they can see patterns and rapidly organize information and problems to reach resolutions. This paper has presented a complex problem and a series of schemata necessary for its resolution as an example of one approach to legal research and analysis. These schemata appeared in three major parts—those designed to help work or see the problem, those dedicated to understanding the terrain of legal resources, and those matching resources to problem types and outlining the legal research process.

The schemata in this article are not meant to be the "be all and end all" of legal research. Rather, they should challenge legal research instructors and librarians to make explicit their own implicit schemata. Hopefully, my colleagues will refine my schemata and introduce their own to the profession. For instance, schemata for institutional, statistical, special, news, and reference searches have not been explored in this article.[39] Ideally, our students will not only adopt and master such schemata for problem solving, but they will also learn to assess and adapt them as needed.

Much of legal academia does not view legal research instruction as anything but training in a mechanical exercise. At a recent faculty meeting dedicated to curriculum reform, a colleague of mine propounded that legal research lacked critical reasoning skills and therefore had lesser priority. Hopefully, this article illustrates that legal research is anything but a mechanical, rote exercise. It requires critical thinking and creativity, including the application of abstract concepts and systems to concrete, complex problems.

I hope the progression of schemata also suggests the possibility of a common hierarchical taxonomy of skills, a Bloom's Taxonomy,[40] to help establish a common vocabulary, define problem-solving skills more precisely, provide a general order for their introduction to students, and set down benchmarks for the improvement and assessment of research skills. Such a project might go a long way toward improving the standing of legal research

in the law school curriculum, but it is a project far beyond the scope of this paper and any one librarian. It must be embarked upon by law librarians and research instructors as a collective, organized effort, perhaps under the auspices of the American Association of Law Libraries.

In criticizing the absence of any discussion of legal research in the Carnegie Foundation's 2007 report on legal education, Richard Leiter notes: "The absence of focused treatment of legal research in the modern debate about reform of legal education happens because we don't have an accurate vocabulary and virtually no research of our own to give form to the discussion."[41] Vocabulary is an initial step in creating a Bloom's Taxonomy. It is part and parcel of constructing the schemata that expert researchers use to solve problems. Arranging vocabulary and schemata into a hierarchical taxonomy that defines the progression of necessary cognitive skills is the ultimate objective. Such taxonomy would establish a credible pedagogy, help communicate the indispensible role of legal research instruction in curriculum reform, and most importantly, improve the research skills of the legal profession.

In closing, my plea is that my colleagues take up the challenge of grounding legal research instruction in a common taxonomy of interrelated schemata, technical vocabulary, and progression of cognitive skills. The failure to have done so suggests that we do not take our own field seriously, and if we do not, why should we expect colleagues from other fields to do so? Indeed, this omission may have kept legal research instruction off of the radar of the elite pedagogues already laboring mightily in the cause of legal education reform. At this critical juncture, we must make the effort to add rigor to our pedagogy by finally defining it. Our students and law faculty colleagues do not "first see, and then define." We must first define, and then they will see.[42]

NOTES

1. Walter Lippmann, *Public Opinion* 81 (7th printing, Macmillan 1961).

2. Commission on Behavioral and Social Sciences and Education, *How People Learn: Brain, Mind, Experience, and School* (expand. ed. 31 National Academics Press 2000), available at http://books.nap.edu/openbook.php?record_id=9853

3. *Id.* (note items 2 and 4).

4. *See Types of Thinking: Expert and Novice Thinking,* Encyclopedia Britannica Online, available at http://www.search.eb.com/eb/article-275929 (last visited 22 Jan. 2009). Throughout this paper, I use the term the technical term "schemata" or "schema" for the singular, but I mean it in the broadest sense to include mental constructs, conceptual frameworks, paradigms, and heuristics.

5. Lippmann, *supra* n.1

6. Parts of this section initially appeared in Paul D. Callister, *Working the Problem*, 91 Ill. B.J. 43, 43 (2003).

7. Apollo 13 (Universal Pictures 1995) (motion picture).

8. Precision is a ratio of relevant documents expressed as:

$$\left(\frac{\text{Number of Relevant Documents Retrieved}}{\text{Total Number of Documents Retrieved}}\right) \times 100$$

Recall is defined:

$$\left(\frac{\text{Number of Relevant Documents Retrieved}}{\text{Total Number of Relevant Documents in the Collection}}\right) \times 100$$

F.W. Lancaster, *Precision and Recall*, 2 Encyclopedia of Library and Information Science 2346, 2346 (Marcia J. Bates, Mary Niles Maack & Miriam Drake eds., 2d ed. Taylor & Francis 2003).

9. For the original schema, as used with government documents, see Jean L. Sears & Marilyn K. Moody, *Using Government Information Sources: Electronic and Print* 5–9 (3d ed. Oryx Press 2001).

10. The placement of case digests and *Words and Phrases* as primary materials may seem odd given their topical arrangement as indexes, but the idea is that they provide a subject arrangement of case summaries granting access directly to the case reporters without intervening commentary.

11. *See* Christopher G. Wren & Jill Robinson Wren, *The Legal Research Manual: A Game Plan for Legal Research and Analysis* 6 (2d ed. Legal Publishing 1986); and Christopher G. Wren & Jill Robinson Wren, *The Teaching of Legal Research*, 80 L. Lib. J. 7, 35 matrix A (1988).

12. For a schemata illustrating precedent in the stream of time, see *infra* and accompanying text.

13. By "tables of authority" (sometimes "points of authority"), I mean the sources cited in a case that, together with that case and subsequent cases, make up the "stream of precedent." Tables of authority can be accessed in the Shepard's and KeyCite features of Lexis and West's online services, respectively. *See infra* figure 9 and accompanying text.

14. *See* Office of Information Resources and Research Services, Digest of Decisions of the Federal Labor Relations Authority (1989-).

15. Both term-and-connector searching and relevancy-ranked natural language searching, each of which is offered by Lexis and Westlaw, operate by computer algorithm. In the case of the former, the search interface responds to specific commands (such as "w/5" or "and") to construct its database search. "Terms-and-connector" searching includes Boolean search commands such as "and," "or," and "not." In contrast, relevancy-ranked natural language searching involves a computer algorithm which "resorts" the database with the most relevant documents "on top." The algorithm may favor documents with search terms that are proximate to each other, in certain fields, or which appear multiple times in the same document. The exact operation of a relevancy-ranked natural language algorithm is proprietary and usually not disclosed. See Danny C.C. Poo & Christopher S.G. Khoo, *Online Catalog Subject Searching*, 2 Encyclopedia of Library and Information Science 2218, 2224 (2003) (description of relevancy-ranked natural language searching); Paul D. Callister, *Introduction to Online Legal Research, Westlaw: Natural Language Searches*, available at http://www1.law.umkc.edu/faculty/callister/bootcamp/ot/NL01.html (last visited 26 Nov. 2008) (archived version of Westlaw and Lexis online services tutorial initially prepared for the University of Illinois College of Law in 2002).

16. *Yahoo! Press Room: FAQ*, available at http://yhoo.client.shareholder.com/press/faq.cfm (follow link to "What does Yahoo! Stand for?") (last visited 12 Sept. 2008). Google's name plays upon the mathematical term, "googol" meaning one with one hundred zeros after it. *Google: Corporate Information*, available at http://www.google.com/intl/en/corporate (last visited 26 Jan. 2009).

17. *See Yahoo! Directory Suggest a Site*, available at http://add.yahoo.com/fast/add (last visited 12 Sept. 2008). Students may confuse Yahoo! Directory with its search engine, which is also algorithmic.

18. *Wikipedia*, available at http://www.wikipedia.org/ (last visited 26 Jan. 2009).

19. *Delicious Social Bookmarking*, available at http://delicious.com/ (last visited 26 Jan. 2009).

20. Jim Giles, *Internet Encyclopedias Go Head to Head*, 438 Nature 900 (2005) (reporting study finding 162 factual errors versus 123 such errors in Wikipedia compared with Encyclopedia Britannica); Paulo N. Correa, Alexandro N. Correa & Malgosia Askanas, *Wikipedia: A Techno-Cult of Ignorance*, available at http://www.aetherometry.com/Electronic_Publications/ Politics_of_Science/Antiwikipedia/awp_index.html (last visited 28 Nov. 2008).

21. Paul D. Callister, *Thinking About Legal Research Problems, Putting a Search Together*, available at http://www1.law.umkc.edu/faculty/callister/bootcamp/Survival/tab5.html (last visited 29 Nov. 2008).

22. For Lexis, see Cases: U.S./Federal & State Cases By State/ CA Federal & State Cases, Combined. For Westlaw, see California State and Federal Cases (CA-CS-ALL).

23. *Gill v. Stern* (*In re* Stern), 345 F.3d 1036 (9th Cir. 2003), *cert. denied; Stern v. Gill*, 541 U.S. 936 (U.S. 2004) (quote from the Lexis Case Summary Overview).

24. *Cheng v. Gill (In re)*, 182 F.3d 1027 (9th Cir. 1999); *Cheng v. Gill (In re* Cheng*)*, 943 F.2d 1114 (9th Cir. Cal. 1991); *In re* Smith, 1998 U.S. Dist. Lexis 22964 (C.D. Cal. 1998), *rev'd on other grounds; Smith v. Kennedy* (*In re* Smith), 235 F.3d 472 (9th Cir. Cal. 2000); *In re* Acosta, 182 B.R. 561 (N.D. Cal. 1994); *McDonald v. Metz* (Metz), 225 B.R. 173 (B.A.P. 9th Cir. Cal. 1998); *Southern Cal. Permanente Med. Group v. Ehrenberg* (*In re* Moses), 215 B.R. 27 (B.A.P. 9th Cir. Cal. 1997); *In re* Witwer, 148 B.R. 930 (Bankr. C.D. Cal. 1992), *aff'd mem; In re* Witwer, 163 B.R. 614 (B.A.P. 9th Cir. 1994).

25. As noted in figure 4 above, researching federal bankruptcy law is really only necessary for background information: to understand that sometimes bankruptcy and federal appellate courts apply state exemptions under 11 U.S.C § 522 (b), and that any interpretive rulings by such courts on California exemption law may be persuasive authority.

26. *See* Stephen J. Krass, *The Pension Answer Book,* ¶ Q 4:26 (2008 ed.) (by searching under "Creditors" in the index, a reference to "qualified retirement plans" can be found, but the discussion in the section is confusing because of the multiple jurisdictions it covers and the fact that it never really goes beyond the issue of whether a plan falls under ERISA and its anti-alienation provisions or whether the plan was properly qualified by the IRS).

27. 1 Pension Plan Guide (CCH) (no paragraph numbering for citing the index, look under "Bankruptcy" in the index).

28. *See* Library of Congress, Thomas, available at http://thomas.loc.gov (last visited 29 Nov. 2008).

29. For search terms, see text accompanying *supra* n. 23.

30. 943 F.2d 1114.

31. California's state exemption statute applies here because under 11 U.S.C. § 522 (b) (2000 & Supp. V 2007) the debtor may use exemptions designated by state statutes rather than those provided in the Bankruptcy Code. Pursuant to Cal Civ. Proc. Code § 703.140 (Deering 2008), debtors may elect to use any exemption from creditors in the California code's chapter, including § 704.115, which exempts "[a]ll amounts held, controlled, or in process of distribution" from a profit-sharing plan. See *id.* at (a)(2) and (b).

32. In the octant schema, this particular Lexis "More Like This" search is a primary, subject, computer algorithm search.

33. *In re* Witwer, 148 B.R. 930 (Bankr. C.D. Cal. 1992).

34. Unlike Lexis' "More Like This" searching, West's "Topic and Key Number" searching is mediated by human beings, and it would be placed in the primary, subject, human-intermediated octant.

35. Citators and annotations are organized by citation (using a combination of subject, jurisdiction, and chronological arrangements) and are located in the third column of table 4, as a category separate from topical or chronological arrangements of law. As such, they are not included as a dimension in the octant schema. It should be noted that Lexis' Shepard's and West's KeyCite are distinguishable on the basis of intermediation. The former is human intermediated, and the latter depends upon computer algorithm.

36. As a combined resource, CCH's Standard Federal Tax Reporter falls both into the primary, subject, controlled vocabulary octant for its arrangement of the tax code, regulations, and annotations of citing cases and IRS rulings (codes, regulations, and annotations follow topical arrangements) and the secondary, subject, controlled vocabulary octant for its CCH Explanations, which are written by editors.

37. *Gill v. Stern* (*In re* Stern), 345 F.3d 1036, 541 U.S. 936.

38. Enforcement of Judgments, 30 Cal. Jur. § 294 (3rd ed. 2000) (discussion of exemptions for private retirement plans in Cal Civ. Proc. Code § 704.115).

39. *See supra*

40. *See* Committee of College and University Examiners, 1 Taxonomy of Educational Objectives: Cognitive Domain 201–207 (Benjamin S. Bloom ed., 31st prtg. Longman 1987).

41. Richard A. Leiter, *The Missing Lawyering Skill, A New Book on Legal Education Demonstrates the Lack of Attention Paid to Legal Research Training,* AALL Spectrum, 22, 25 (July 2008). *See also* William M. Sullivan, et al., Carnegie Foundation for the Advancement of Teaching, *Educating Lawyers: Preparation for the Practice of Law* (Jossey–Bass 2007) (as Leiter has pointed out, note the lack of any reference to "legal research," "library," or "research" in the index).

42. *See* Lippmann *supra* n. 1