

## Instructional Design with Expertise in Mind (Part 2)

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**Q**uick – can you remember all three principles discussed in Part 1 of this two-part article? Unless you’ve gone over the article many times and put those concepts into practice over and over again, you likely need a little reminder.

- **Principle 1:** Experts notice features and meaningful patterns of information that are not noticed by novices.
- **Principle 2:** Experts have acquired a great deal of content knowledge that is organized in ways that reflect a deep understanding of their subject matter.
- **Principle 3:** Experts' knowledge cannot be reduced to sets of isolated facts or propositions but, instead, reflects contexts of applicability: that is, the knowledge is ‘conditionalized’ on a set of circumstances.

These three principles from “How People Learn” are accompanied by three more, described below with some examples of how to use them in practice.

### Principle 4

“Experts are able to flexibly retrieve important aspects of their knowledge with little attentional effort” (Committee on Developments in the Science of Learning, Commission on Behavioral and Social Sciences and Education, & National Research Council, 1999, p. 31).

Experts have “knowledge fluency”, a seemingly “automatic” recall of knowledge (Schneider & Shiffrin, 1977). For expert information seekers, finding information comes ‘naturally’ – it doesn’t take a lot of effort to recall appropriate strategies. Because of this, experts are free to think about other things (Anderson, 1981, 1982; LaBerge & Samuels, 1974; Lesgold et al., 1988; Schneider & Shiffrin, 1985).

Novice researchers spend working memory recalling specific strategies and concepts. While novices try to remember how to use OR and AND appropriately for combining search terms, expert searchers focus attention on generating more words for the search – recalling the mechanics of Boolean operators happens very quickly and without attention.

### *Principle in practice*

What does this mean for instructional design? Instructors must pay attention to their own expertise and recognize that novices do not move through databases as effortlessly as experts do.

Library catalogs are often a part of library instruction. Librarians who have spent countless hours using the catalog can be quite savvy with it, perhaps without even realizing their own expertise. It is difficult to recognize expertise in oneself (Commission on Behavioral and Social Sciences and Education, Committee on Techniques for the Enhancement of Human Performance, & National Research Council, 1991) because performing actions is implicit.

Good instruction ensures that these implicit actions are made explicit. This example illustrates one strategy to accomplish this:

When the librarian teaches a class, she counteracts her urge to click through the catalog quickly by stepping away from the computer before each click. For example, when she describes the quickest way to search for a book using its title, she pulls down a dropdown menu and moves her cursor on top of the “Title begins with...” option, but before actually clicking to select it, she steps away from the computer and to the projection screen, pointing with her finger to the menu. While it may seem perfectly natural to her to select this option, she realizes that students may not know where this option is, or why it is most effective. By highlighting the search option, “Title begins with...” and then moving away, she has the opportunity to explain why she chose it and gives students time to see where that option is.

Had she pulled down the menu and clicked on the option she wanted, she might have sped through a screen students needed more time to understand. By physically moving away from the computer and the mouse, she created a pause that counteracted her own implicit actions in the catalog that result from her expertise.

Librarians can also force themselves to slow down in the planning process. When writing a script or lesson plan, they can write down each individual step in the exercises they do with the class. This task makes explicit each step in the process, and gives the librarian an opportunity to reflect on the “why” of each step as well.

### Principle 5

“Though experts know their disciplines thoroughly, this does not guarantee that they are able to teach oth-

ers” (Committee on Developments in the Science of Learning et al., 1999, p. 31).

There is a saying, “Those who can, do; those who can’t, teach”. While this saying has its flaws (e.g., it might be unfairly used to denigrate teachers), it is actually insightful into the limitation of content experts. Being an expert searcher does not make one an expert *teacher* of searching and as we saw with Principle 4, can sometimes make it harder. The ability to stand in front of a class and engage students is also a skill to master.

Pedagogical knowledge, like any other content knowledge, is conditionalized (Schulman, 1986, 1987). Teaching strategies for information literacy could be different than strategies for teaching in other fields. In other words, those strategies that are especially effective for teaching mathematics may not be as effective when teaching the searching of databases. Instructors with expertise in teaching information literacy best serve library instruction.

### *Principle in practice*

Librarians versed in pedagogy can design library sessions that help students achieve information literacy.

When teaching students how to find peer-reviewed articles on the library’s website, a librarian passes around physical copies of journals they might use in their papers, including both popular publications like TIME and Newsweek as well as peer-reviewed titles. He asks them to look through the journals materials for a minute or two and find information about the authors and the editors of these pieces. He then asks them to report back on the differences in the two types of publications.

An expert in information literacy would know what makes peer-reviewed titles different from popular titles. However, this instructor, knowledgeable about pedagogy, avoided simply telling students the differences. He realizes that when students construct their own explanations and reasoning, they learn better.

### **Principle 6**

“Experts have varying levels of flexibility in their approach to new situations” (Committee on Developments in the Science of Learning et al., 1999, p. 31).

ACRL’s Information Literacy Competency Standards for Higher Education include the ability to recognize

when there is an information need. Kuhlthau’s (2003) model of the information seeking process begins with this step as well. Additionally, in their final principle, the authors of “How People Learn” echo this competency: “The ability to recognize the limits of one’s current knowledge, then take steps to remedy the situation, is extremely important for learners at all ages” (Committee on Developments in the Science of Learning et al., 1999, p. 47).

An expert may not know everything there is to know about their expertise, but they realize their own deficiencies and address them. Instructors in library sessions must help students recognize when they need additional instruction or help and make those learning resources available to them. A casual mention of reference desks and reference e-mail and chat services may not be enough; like other knowledge, it must be conditionalized. Letting students know that it is common to feel stuck and that there are places to go for help is important in developing students that seek out assistance when they need it.

In addition, we must find ways to help students understand the big ideas that will help them adapt the knowledge they gain to situations they have not encountered. Miller (1978) describes two types of experts: artisans and virtuosos. While artisans are capable of recalling strategies and solving problems in specific situations, virtuosos can “exhibit their positive characteristics despite their training” (Miller, 1978 in Committee on Developments in the Science of Learning et al., 1999, p. 46). Context is important in recalling and using knowledge; however, experts do not rely on being in that context in order to apply knowledge.

This is particularly true with library resources. Because databases differ in their capabilities and features, effective library users demonstrate characteristics of virtuosos. An artisan might be an expert searcher in only one particular database, for example, knowing where to click and how to use its controlled vocabulary, but a virtuoso can apply searching skills across a variety of databases, regardless of the database they use.

### *Principle in practice*

While one or two fifty-minute sessions of library instruction cannot make virtuosos out of novices, we can try to teach some of the characteristics of virtuosos to make our students more flexible in a library environment.

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A librarian demonstrates the use of controlled vocabulary in a database. Rather than simply conducting a canned search, she takes the time to explain the big ideas behind controlled vocabulary. In addition, she questions the class on why controlled vocabulary is important, and when it can be useful. She allows the students to research their topics, and has them share the controlled vocabulary terms that best fit their topics.

Then, in a database with a different interface, before diving in to how to use the database's tools, she prepares the class to think about controlled vocabulary again. She asks students to suggest search terms, and upon getting results, to identify controlled vocabulary terms in the records they examine. Many students point out the "Descriptors" field and suggest that those may be controlled vocabulary terms.

Finally, she takes them to a database without controlled vocabulary. When they search in this database, students realize that there is no "descriptor" field. She asks them what words should be used. A student suggests using the terms they found in other controlled vocabularies in the other databases. The librarian agrees, and also suggests that in addition to those, brainstorming other words that might be used, tying in Boolean searching.

In this scenario, despite searching in databases with different content and different controlled vocabularies, the librarian is preparing them to develop flexibility with the concepts they learn. She does so by stepping back from a new database and asking her students to explicitly think about controlled vocabulary and its utility. She separates the concept of controlled vocabulary from a particular database, but reinforces the notion that controlled vocabulary is used in certain situations that students can recognize. These questions guide students into making connections between problems and solutions, not between interfaces and tasks.

### Instructional Design with the Novice in Mind

Instructors cannot expect to make experts out of novices. The time constraints of course-integrated instruction provide a difficult challenge for library instruction. Instructors are also limited by little or no continuity with students (Jacobson & Xu, 2004). However, despite these circumstances, effective library instructors can use knowledge of the nature of expertise to plan lessons that have a lasting effect on students.

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