as a team consensus-building tool (Lipmanowicz and McCandless 2017b). The activity uses timed cycles for individuals, pairs, and small groups to complete collaboration tasks. By the end of the exercise, each team member has spoken multiple times, listened to colleagues, and agreed on a decision.

**Backward Design**

The key to creating learning objects that will be used and valued is connecting them to the competencies students need to meet. The Framework was strategically designed to dovetail with general higher education competencies (ACRL 2016). Creating a curriculum map of the various competencies and linking them to the Framework allows you to identify which areas of the Framework are most needed and should be prioritized. A curriculum map reinforces the fact that you are working in tandem with faculty on a clearly articulated and unified purpose. While the map is a useful communication and advocacy tool, with or without it, it is essential that you work closely with faculty to strategically identify areas of the curriculum where content will enhance or fill gaps. You will use this map (or your knowledge of curriculum needs) in the process of backward design (described in this section). Figure 3.1 shows an excerpt of a map linking the various competencies in medical education.

Backward design is a curriculum planning model that focuses on outcomes and how students demonstrate competency. Designed by McTighe and Wiggins (2012), backward design has three interrelated stages:

- Stage 1—Identify desired results.
- Stage 2—Determine assessment evidence.
- Stage 3—Plan learning experiences and instruction.

**FIGURE 3.1**

Sample Curriculum Map Excerpt

<table>
<thead>
<tr>
<th>Health Information Literacy Competencies</th>
<th>SoM</th>
<th>SoM Graduation Competencies</th>
<th>ACGME</th>
<th>ACGME Common Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Management</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Creation as Process</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>KM-C1 Articulate the capabilities and</td>
<td>MK2</td>
<td>Provide evidence for their</td>
<td>MK. IPA 5.b</td>
<td>Research requires the</td>
</tr>
<tr>
<td>constraints of various research and</td>
<td></td>
<td>diagnostic and management</td>
<td></td>
<td>demonstration of</td>
</tr>
<tr>
<td>information creation processes as they</td>
<td></td>
<td>decisions based on</td>
<td></td>
<td>knowledge of</td>
</tr>
<tr>
<td>relate to medical practice.</td>
<td></td>
<td>application of medical</td>
<td></td>
<td>established and evolving</td>
</tr>
<tr>
<td></td>
<td></td>
<td>knowledge and clinical</td>
<td></td>
<td>biomedical, clinical,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>reasoning.</td>
<td></td>
<td>epidemiological, and</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>social-behavioral</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>sciences, as well as the</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>application of this</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>knowledge to patient care</td>
</tr>
</tbody>
</table>

| MK3 Scientifically appraise innovative   |     |                            |       |                          |
| concepts and practices for potential     |     |                            |       |                          |
| value in patient care.                   |     |                            |       |                          |

While McTighe and Wiggins apply their stages to a curriculum, we have found that the same stages (adapted slightly) work in designing learning objects (see figure 3.2).

**Backward Design Stage 1: Identify Desired Results**

What should the student be able to do at the end of instruction? (McTighe and Wiggins 2012)

This is the most crucial and most difficult stage. You are establishing both the outcome and the scope of the learning object. The key to this stage is to identify what a student should be able to do, not what you will teach. Education and marketing researchers recommend retaining maximum engagement by keeping learning objects between eight and fifteen minutes long (Izenberg 2015).

Pull out your curriculum map, or at least the Framework, and begin selecting components to teach. As you do, note that some knowledge practices and dispositions from the Framework can be used as is, but they often require some customization. Here are some of the ways in which the NLA modified the Framework as we began using it as the basis of backward design.
Approach the Framework

The following knowledge practice covers a great deal of content: "Articulate the purpose and distinguishing characteristics of copyright, fair use, open access, and the public domain" (ACRL 2016; emphasis added). A more manageable outcome might simply be this: "Articulate the purpose and distinguish the characteristics of copyright." Other modules focusing on fair use or open access or public domain could be created separately. Without being overly summative, it would be difficult in eight to fifteen minutes to meaningfully explore copyright, fair use, open access, and public domain.

Figure 3.3 illustrates highlighting a portion of the Framework—a knowledge practice or a disposition that is too big to cover in eight to fifteen minutes.

Highlight One Primary Frame

The Framework contains interrelated and overlapping content. Many concepts can be viewed through different "frames" (see figure 3.4). Sometimes you will want to teach a concept in the center of multiple overlapping areas. However, a learning object must focus on one outcome and be capable of being assessed and taught online. Exploring content through different frames is an excellent way to expand critical thinking as well as comprehension. You may choose to present the same content through different frames in subsequent learning objects or in-person instruction. Multiple frames may be cited as foundations for a particular learning object. However, when you write a learning outcome and design a learning object that can be taught and assessed in approximately eight to fifteen minutes, we advise sticking with one frame. By focusing on one frame, you can structure content clearly and concisely, providing a more direct path to comprehension.

As the NLA began working on a learning object focused on the “Scholarship as Conversation” frame, we found that the following knowledge practices (modified from the Framework) overlapped and could not be easily separated:
As you consider what students should be able to do, remember that the Framework expanded what is expected of students. They are required to be both consumers and creators of information within digital environments (ACRL 2016). Learning objects are far better environments than face-to-face instruction for students to learn and demonstrate this principle. By placing this content in learning objects, students are learning and demonstrating to you these abilities in the “natural environment.”

We recognized that the learning object could touch on several knowledge practices and/or dispositions simultaneously. While we as the educators were aware that the learning object lay between three knowledge practices, for clarity, we gave our students only one focused outcome. The entire learning object was written around “Conversation changes over time” and referenced the other two knowledge practices only in the notes section (see figure 3.5).

**Choose a Level**

You can also customize a knowledge practice or disposition to various levels of expertise, creating lessons addressing the novice through to the expert, as shown in figure 3.6 (Dreyfus and Dreyfus 1980).

For example, in the frame “Searching as Strategic Exploration,” knowledge practice five reads “design and refine needs and search strategies as necessary, based on search results” (ACRL 2016). You can target lower-level undergraduate students being exposed to the concept for the first time by introducing limits, controlled vocabulary, or the process of revising a basic search strategy. Alternatively, the concept can be expanded and taught at a much higher level, exploring discipline-specific strategies and/or advanced evidence-based practice research strategies.
**FIGURE 3.5**
Overlap versus User View

"Scholarship as Conversation" Learning Object

KP 1 – Authority/who gets listened to
KP 2 – You can join the conversation
KP 3 – Conversation changes over time

**FIGURE 3.6**
Novice-to-Expert Steps

Desired result = a gradient within the novice-to-expert spectrum


**Backward Design Stage 2: Determine Assessment Evidence**

How will we know if students have achieved the desired results? (McTighe and Wiggins 2012)

In this stage, you must articulate what the students will do in order to demonstrate that they understand the content. Here it helps to envision what someone who understands the topic can do that others cannot. You will want students to show you that skill or behavior. Simply put, if you want to teach a student to ride a bike, you will know that the student has achieved the desired result when you see the student ride from point A to point B. The student’s ride is the evidence.
In information literacy instruction, this stage requires librarians to create new knowledge by envisioning what the knowledge practices and dispositions of the Framework look like within various disciplines. Librarians are being called upon to articulate how a student has embraced threshold concepts or “portals to enlarged understanding or ways of thinking and practicing” (ACRL 2016). The Framework does not specifically tell you what evidence you should expect to see in performing arts students or biology students who have embraced the threshold concept and applied it to their subject area. Defining what these observable information practices are as they relate to specific disciplines is part of the cognitive work that information literacy librarians are being called upon to provide.

**Choose a Bloom’s Taxonomy Level and Verb**

To begin, select the appropriate Bloom’s Taxonomy level (see figure 3.7) and verb to describe how you anticipate observing proficiency (Bloom and Krathwohl 1956). Will the student simply label something (knowledge level) or will the student solve a problem (application level)?

**Write a Learning Outcome**

Remember that only one learning outcome should be used with an eight-to-fifteen-minute learning object (Izenberg 2015). There are many formulas and systems for writing outcome statements, but the Stiehl and Lewchuk (2008) model that is also used by Debra Gilchrist (2010) serves online learning object design especially well by forcing writers to articulate necessary components of the lesson plan early in the process. It also requires you to clearly state the assessment goal, which is important to backward design, as in the figure 3.8 example.

**OUTCOME FORMULA**

1. Begin with the phrase “The student will . . . ,” which implies “by the end of the lesson.” (Sometimes this is implied, but not written down.)
2. Add your selected Bloom’s Taxonomy verb.
3. Add a short phrase describing the assessment evidence identified in stage 2 of backward design. (This is a short description of how you will observe the student demonstrating that he or she knows and can act on the information being taught.)
4. Add the phrase “in order to.”
5. End with the desired results identified in stage 1 of backward design. This is the area of the Framework selected and the task that you want students to be able to do after completing the module.

Use the Outcomes Checklist on page 28 to review your completed outcome statement.
FIGURE 3.7
Bloom's Taxonomy

<table>
<thead>
<tr>
<th>Level</th>
<th>Verbs</th>
<th>NLA Examples</th>
</tr>
</thead>
</table>
| 1. **Knowledge**  
(Recall information.) | Define  
List  
Recognize  
Match  
Label  
Name  
Identify | Identify the characteristics of information in order to measure the value of information.  
Identify research strategies in order to discover more recent, contemporary contributions to a scholarly conversation. |
| 2. **Application**  
(Apply knowledge or generalize to new situation.) | Apply  
Interpret  
Use  
Demonstrate  
Stretch  
Dramatize  
Illustrate  
Solve  
Prepare | Use the appropriate type of evidence (research studies) in order to address different types of clinical questions. |
| 3. **Synthesis**  
(Bring together parts of knowledge to form a whole and build relationships for new situations.) | Arrange  
Create  
Prepare  
Compare  
Design  
Propose  
Conduct  
Organize  
Write | Construct a search strategy in order to use search tools more efficiently. |
| 4. **Comprehension**  
(Interpret information in your own words.) | Classify  
Report  
Describe  
Select  
Discuss  
Translate | Make (select) informed decisions in order to anticipate the effects of access in your life and in the community. |
| 5. **Analysis**  
(Break down knowledge into parts and show relationship among parts.) | Categorize  
Criticize  
Examine  
Compare  
Differentiate  
Question  
Contrast  
Discriminate  
Test | Compare two search outcomes in order to construct a search strategy.  
Differentiate between different digital formats in order to resolve your information need. |

CHAPTER 3

FIGURE 3.8
Learning Outcome Formula

OUTCOMES CHECKLIST

☐ There is only one outcome per learning object.

☐ Outcome does not include multiple commas. Multiple commas indicate an outcome that is too large. Lists are condensed into descriptive phrases.

☐ Outcome follows the formula. Outcomes should follow the sentence structure outlined in the Outcome Formula, including an appropriate Bloom's Taxonomy verb, evidence, "in order to" phrase, and desired results.

☐ Bloom's Taxonomy verb is appropriate for the task. The highest possible level of Bloom's Taxonomy is used.

☐ Language is clear. Outcomes should be understandable to all stakeholders in higher education, not just instructional librarians. Language should be simple and concise.

☐ Outcome is realistic. The scope of the content is appropriate for the time frame and audience.

☐ The evidence and desired results are balanced. The evidence that will be observed is appropriate considering the desired outcome. The evidence does not demand more than is necessary of the student, nor does it demand too little.

☐ Outcome is measurable and assessable. The outcome can be observed and measured. For example, if the student is supposed to "match A to B," that task can easily be both observed and graded. However, anticipating that the student "understands A and B" is not measurable or assessable. Most concretized outcomes can be graded through software.

NLA EXAMPLE

The student will be able to identify steps necessary in order to discover more recent contributions to the scholarly conversation about a topic.
Backward Design Stage 3:
Plan Learning Experiences

How will we support learners as they come to understand important ideas and processes? (McTighe and Wiggins 2012)

Finally, after the outcome and assessment are written, it is time to create the learning object with its multiple activities. This is the time to unleash the creativity of the instructional designers and content writers. Using backward design (McTighe and Wiggins 2012) keeps the content focused on the outcome and ensures that the activities do not devolve into tangents. Avoid the temptation to incorporate a shiny new widget or a popular activity and then attempt to justify it by altering the outcome or assessment. Not only does this diverge from backward design; it also creates gaps in the lesson that frustrate the learning process.

Most instructional design software programs offer writers a common set of possible activities. However, activities vary from program to program and the skill of an instructional designer can greatly expand the types of activities that can be successfully deployed.

Common Instructional Design Program Activities

<table>
<thead>
<tr>
<th>Drag and drop</th>
<th>Timeline or sequence</th>
<th>Photo album activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flashcards</td>
<td>Labeling</td>
<td>Quiz group</td>
</tr>
<tr>
<td>Matching</td>
<td>Sorting</td>
<td>Align activity</td>
</tr>
<tr>
<td>Multiple choice</td>
<td>Jigsaw puzzle</td>
<td>Identify activity</td>
</tr>
<tr>
<td>Fill in the blank</td>
<td>Ordering items</td>
<td>Selection activity</td>
</tr>
<tr>
<td>Match pairs</td>
<td>Slideshow</td>
<td>Charts activity</td>
</tr>
<tr>
<td>Crossword</td>
<td>Seek a word</td>
<td></td>
</tr>
</tbody>
</table>

Learning Object Structure

NLA instructional designers developed a storyboard template to translate general lesson content into digital learning objects (Pitts, Lenz, and Nash 2013). Unlike in-person lectures or even online coursework, the writing for learning objects needs to be succinct and graphical, appropriate for screen reading. This storyboard template is meant to help you think through a learning object as it will appear online, and as the students will interact with it. It is meant to be a guide rather than a rule. If creating multiple learning objects, a template such as this provides uniformity that will aid students in navigation.

The storyboard template uses the formula for storytelling to deliver learning content (see figure 3.9). Both begin with an introduction that lays out the context. In literature, character development is established, and in the online lesson storyboard, definitions are provided and the concept is introduced. Then, the story rises and an activity, such as a reflective poll or
hypothetical situation, is introduced to make the content more relevant to the learner. In the introduction section, the problem is stated and instruction is given regarding the problem. The complication/problem section is where options are demonstrated for resolving the problem. Then, in the climax, the student is given the opportunity to practice solving the problem through an activity. Finally, in the resolution of the story, the main character (the learner) spends time reflecting on the journey or the content. This debriefing summarizes the content covered and is followed by some form of formative assessment (quiz questions, etc.).

The entire storyboard template appears as appendix D in this book.

**Customization and Rearrangement**

Technology allows for nuances in learning customization not possible in traditional face-to-face instruction. Students can self-select modules or pass through gated assessments that differentiate learners into an appropriate content level. Technology can also allow for students to “quiz out” of content and move on to other areas. Instructors are able to take apart online lessons and deliver components, such as a single quiz, a video, an activity, a reflection poll, and so on, independently or in different combinations. The possibilities for reusing content à la carte are endless.

**Final Learning Object Rubric**

When you finish the plans for your learning object, ask a peer to review it using the rubric provided in appendix E. Work with instructional designers and fellow content creators to move through the iterative creation process.
References


Gilchrist, Debra. 2010. “Assessment as Learning.” Presentation at the University of Kansas Libraries Instruction Workshop, Lawrence, Kansas.


Learning Object Rubric

<table>
<thead>
<tr>
<th>Learning Object Length</th>
<th>Needs</th>
<th>Ready</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning objects are &lt; 8-15 minutes long.</td>
<td>Editing</td>
<td>to Go</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcomes</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcomes checklist has been successfully completed. [See chapter 3.]</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning Activities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>All activities are necessary and lead to the outcome.</td>
<td></td>
</tr>
<tr>
<td>Reviewer is able to envision the activities based upon descriptions.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storyboard Structure and Content</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction defines new terms and provides adequate context.</td>
<td></td>
</tr>
<tr>
<td>The relevancy of content to students' lives is clear.</td>
<td></td>
</tr>
<tr>
<td>The problem to be solved by mastery of content is presented.</td>
<td></td>
</tr>
<tr>
<td>The main activity (climax) allows students the opportunity to demonstrate their learning.</td>
<td></td>
</tr>
<tr>
<td>The resolution allows students to reflect on learning and content.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment is provided.</td>
<td></td>
</tr>
<tr>
<td>Outcome is directly assessed.</td>
<td></td>
</tr>
<tr>
<td>Assessment is completely automated.</td>
<td></td>
</tr>
<tr>
<td>Preassessment is included for gating or differentiation.</td>
<td></td>
</tr>
<tr>
<td>Students are provided with feedback for correct and incorrect responses.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assessment Criteria</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pass-fail and/or grading criteria are set.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attribution and Copyright</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Attribution/references are complete.</td>
<td></td>
</tr>
<tr>
<td>Copyright permissions have been obtained (if necessary).</td>
<td></td>
</tr>
<tr>
<td>Your author's rights are preserved (© or CC).</td>
<td></td>
</tr>
</tbody>
</table>