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Whether you're working on the tenth edition of your text or the first, we ask that you spend 30 minutes reading this guide, which explains what you can do when writing and revising your content to help us make this transformation possible. Rest assured, we are not asking you to prepare interactive content or activities (we have a tech team here at Elsevier who will be doing that). We just need you to prepare your text so it can be easily integrated into digital products.

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We thank you.

WRITING AND REVISING TEXTBOOKS WITH DIGITAL IN MIND

Writing and organizing a textbook with digital distribution in mind is a little different than writing and organizing a textbook for print publication alone. Whereas the print textbook was once the only learning product, it **now also serves as a repository of content that can be used directly or repurposed for a host of digital learning products**. In addition, this generation of students are the first truly digital native learners. It's therefore more important than ever to approach textbook writing in a way that aligns with this multimodal digital integration and with how students now absorb content.

Fortunately, writing and revising print textbooks with a correlating digital product in mind doesn't require that you abandon what you already know. Rather, it requires that you embrace more intentionally best pedagogical practices for textbook writing. This guide explains how to create the most effective content for print and digital consumption. The discussion that follows focuses on reducing cognitive load (how much content a reader's working memory can retain) using three methods:

- Creating **measurable Learning Objectives (LOs)**, using Bloom's Revised Taxonomy and carefully tying all the content to these LOs.
- **Clustering content**, using the correct level and number of heads (H1, H2, H3, etc.).
- **Chunking content** into shorter, "digestible" bits. Keep **proportionality** in mind as you cluster and chunk. Sections should be relatively the same size.

PART I: PRINCIPLES OF INSTRUCTIONAL DESIGN AND LEARNING SCIENCE

Reducing Cognitive Load

Cognitive load refers to the limited capacity we have to process information at any given time. This means minimizing distractions and extraneous information. If we're forced to process excess information, our working memory becomes overloaded. We end up forgetting new information or simply giving up. **The best chance of getting information into long-term memory—and therefore being able to apply that knowledge—is by reducing cognitive load.**

The goal of any teaching strategy is to provide information in the most effective and efficient way possible to avoid cognitive overload. A textbook that has

- unclear learning goals,
- extraneous content, and
- an inconsistent organizing principle

creates an environment in which students have difficulty learning.

This threat to learning is heightened in a digital environment. Learners increasingly rely on the digital environment—and digital tools—to engage with and internalize content, as well as to remediate academic struggles they experience.

Learners are also increasingly engaging with content from remote locations, often asynchronously—that is, without the real-time (synchronous) guidance of an instructor. **The need to produce clear, organized content is thus more important than ever.**

The Power of Example

One great way to reduce cognitive load and improve student understanding and retention is by **using real-life examples in your writing**—especially examples taken straight from the context students are reading about—a nursing environment, for example—so they can engage more easily with the concepts being taught. What's more, infusing these real-life examples into your print writing will provide the digital team with content for creating lessons and interactive activities that allow students to practice skills and imagine themselves in certain environments.

Creating Clear Learning Objectives

Learning objectives serve as the bridge by which traditional textbook content can be transformed into digital products. Sound learning objectives serve two functions:

- They provide a road map—a clear direction and educational goals—for students.
- They act as a framework for the creation of digital lessons, exercises, and assessments.

Creating Clear, Measurable Learning Objectives as a Student Road Map

When writing and revising learning objectives, it's important to determine what *exactly* students should take away from each section. This is because **clear learning objectives enhance student learning and retention**. This is also because **learning objectives help to determine the digital content that is produced**—not only the lesson that's created but also the level at which it is assessed.

It's important that all learning objectives **employ action verbs that are measurable**—that is, a student can display the objective in some way. This is so that

- students know exactly what you're asking them to do and what they'll be asked to demonstrate, and
- instructors will be able to see clearly and grade what students can and can't do after finishing a lesson.

Clear learning objectives help students understand what it is they are supposed to learn from what they are reading. They also guide instructors on creating assessments and creating lectures. In the digital environment, they serve as measurable outputs that instructors can use to determine comprehension of a particular subject, either by individual student or as a classroom as a whole. Clear learning objectives are the most important foundation for all digital learning because they help designers quickly identify student learning gaps and can be used to create remediation plans and strategies within the adaptive program.

What does this mean for you as an author? **When writing learning objectives, avoid words such as “know,” “understand,” “appreciate,” “learn,” and so on—that is, any word that isn't an action a student can demonstrate through a concrete assessment.**

- For example, if you stood in front of students and said, “*Appreciate* the core principles involved in researching human subjects,” students could respond by saying, “Ok, I appreciate them” and be correct.
- But if you said, “*Identify* the core principles involved in researching human subjects,” then **students will clearly know what you expect them to be able to do.**
- In short, a student should be able to easily show you what they know.

The table below shows some examples of unmeasurable learning objectives that have been transformed into measurable ones.

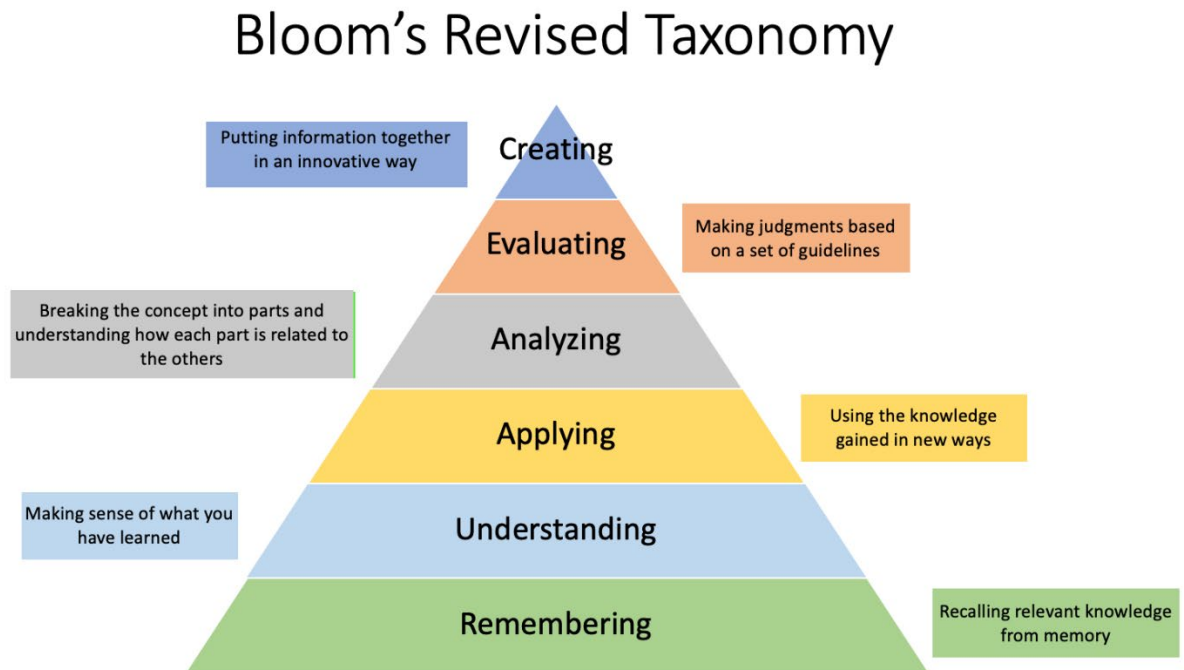
Unmeasurable Versus Measurable Learning Objectives	
Unmeasurable Learning Objectives	Measurable Learning Objectives
Understand the dietary needs of elderly patients diagnosed with Crohn's disease.	List the five primary dietary needs of elderly patients diagnosed with Crohn's disease.
Comprehend the positions in radiology.	Describe each of the positions for a radiographic examination.
Know how to work with various fractions.	Subtract fractions with unlike denominators.
Learn how receptor theory works in pharmacodynamics.	Diagram how receptor theory works in pharmacodynamics.

Be familiar with terminology associated with health assessments.

Define the techniques used to enhance data collection when interviewing a patient.

Using Bloom's Revised Taxonomy to Align Learning Objectives with Desired Learning

Bloom's Revised Taxonomy plays a central role in creating learning objectives that adhere to instructional design principles. Bloom's is a classification scheme for levels of learning, or cognition. Bloom's levels of cognition, from lowest to highest, are remembering, understanding, applying, analyzing, evaluating, and creating, as shown here:



Just as it's important to create clear, measurable learning objectives, **it's important for learning objectives to be appropriate to the level of cognition required of the student.**

Bloom's in Action

- For example, if after reading a section, students should be able to *evaluate* a process, a higher-order cognitive task, the learning objective should employ a verb that explicitly states this higher-order goal in a measurable way.
 - Here are some examples of effectively worded learning objectives for the **Evaluating** level of Bloom's Taxonomy:

After reading this section, students should be able to:

- Assess the pros and cons of using online patient health assessments.
- Appraise how effective drug treatment alone is in treating post-partem depression.
- Critique the current best practices for emergency intubation practices of children under 10.

- Similarly, if students only need to *memorize* a concept, a lower-order cognitive task, the verb used in the objective should indicate this in a measurable way as well.
 - Here are some examples of effectively worded learning objectives for the **Remembering** level of Bloom’s Taxonomy:

After reading this section, students should be able to:

- Recall the six standards of nursing practice.
- Define active listening in the context of interviewing a patient.
- Identify the core principles involved in researching human subjects.

Coming up with exactly the right measurable verb can be challenging. The table below provides a list of action verbs aligned with each level of Bloom’s Taxonomy. The list isn’t exhaustive but should provide a good starting point for verbs you can choose from. Note that some action words can be classified on different levels of Bloom’s depending on the particular context. The table below shows the most common uses of each.

Bloom’s Revised Taxonomy Action Words					
Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
define	categorize	administer	analyze	appraise	compile
identify	contrast	apply	categorize	assess	compose
label	describe	calculate	characterize	choose	construct
list	differentiate	change	classify	compare	create
match	discuss	chart	connect	conclude	design
name	explain	choose	contrast	critique/criticize	develop
order	give examples	collect	correlate	debate	devise
recall	outline	complete	deconstruct	decide	diagram
recognize	summarize	demonstrate	deduce	defend	formulate
record		determine	diagram	estimate	generate
state		execute	diagnose	evaluate	hypothesize
		implement	differentiate	grade	integrate
		interpret	distinguish	judge	make
		interview	examine	justify	modify
		modify	explain	measure	organize
		operate	plan	order	prepare
		record	prioritize	persuade	produce
		schedule	separate	predict	propose
		select		rank	revise
		teach		rate	rewrite
		use/utilize		recommend	solve
				score	substitute
					write

Examples of Learning Objectives at Each Bloom's Level

The following are examples of learning objectives for each level of Bloom's:

Remembering: Recognize the components of a nursing plan of care.

Understanding: Describe an effective nursing plan of care.

Applying: Implement a nursing plan of care for patients with peripheral arterial disease.

Analyzing: Prioritize nursing interventions within a nursing plan of care for patients with peripheral arterial disease.

Evaluating: Assess the effectiveness of nursing plans of care for patients with peripheral arterial disease.

Creating: Design an alternative standard template for a nursing plan of care that improves the current model while meeting the needs of today's nursing profession.

Creating Learning Objectives That Serve as a Digital Framework

In print textbooks, the placement of learning objectives in a chapter is sometimes arbitrary. One author might put them at the start of the book, another at the start of a chapter, while another might place them next to each main heading. Other authors might not include learning objectives at all.

In transforming print textbooks into digital products, however, **learning objectives require very specific placement: each objective must be carefully aligned with headings.**

This is because **learning objectives provide the framework upon which digital products are created.** Digital product developers use learning objectives to determine:

- the structure of the lessons they create,
- what kinds of assessments they can use to measure student understanding, and
- where to remediate students based on these assessments.

Without a consistent learning objective structure, none of this is possible.

The Two Main Types of Learning Objectives

There are two main types of learning objectives that are required for effective digital transformation:

- **Terminal Learning Objectives (TLOs)** are the broad goals or core skills students should take away from a chapter.
 - For textbooks to be used effectively in digital learning environment, ***a TLO should be aligned to each main section heading (or H1) in a chapter.***
- **Enabling Learning Objectives (ELOs)** are what learners must be able to do to demonstrate mastery of a particular Terminal Learning Outcome.
 - For textbooks to be used in digital learning environment, ***an ELO should be aligned to each second-level heading (or H2) in a section.***

Terminal Learning Objectives (TLOs) have a higher Bloom’s cognitive level, whereas Enabling Learning Objectives (ELOs) are lower than or equal to the TLO Bloom’s level. The ELOs assist students in achieving the higher-order TLOs.

An Example of TLOs and ELOs in Action

Here’s an example of how aligning TLOs and ELOs to headings might play out in a chapter.¹

“Types of Health Assessment” is the H1 section heading. It is aligned with a broad Terminal Learning Objective (TLO).

These are the three second-level heads (H2s) in this section. Each H2 is aligned with an Enabling Learning Objective (ELO). Mastery of these ELOs leads to mastery of the broader TLO for the section.

H1: Types of Health Assessment

- TLO: Summarize the primary factors that influence the amount of information gained during a health assessment.

H2: Context of Care

- ELO: Explain how the context of a situation influences the type of assessment that might be performed.

H2: Patient Needs

- ELO: Articulate how patient needs play a role in determining health assessments.

H2: Nurse Expertise

- ELO: Describe how a nurse’s level of expertise can shape the health assessment process.

Steps to Follow When Writing or Revising Learning Objectives for a Chapter

When writing or revising a chapter, follow these steps to create effective TLOs and ELOs.

STEP 1: Determine the Chapter’s Terminal Learning Objectives (TLOs)

- Each main concept should be one of the main section headings (H1s) in the chapter.
- Each main section heading (H1) should have a TLO aligned with it. That is, TLOs should equate on a 1-to-1 ratio to main section headings (H1s). **If there is a main section heading (H1), there should be a TLO accompanying that heading and vice versa.**
- Use Bloom’s as a guide to articulate a precise, measurable TLO using the actionable verb most appropriate for that intended outcome.

STEP 2: Determine the Chapter’s Enabling Learning Objectives (ELOs)

- The most important concepts within each main section (H1) should be aligned to each of the second-level heads (H2s) in the section.
- Each second-level section heading (H2) should have an ELO aligned with it. That is, ELOs should equate on a 1-to-1 ratio to the second-level heads (H2s). **If there is a second-level head (H2), there should be an ELO accompanying that heading.**
- If a main-level (H1) section has an ELO, there should be a minimum of at least two ELOs.
- Use Bloom’s as a guide to articulate a precise, measurable ELO using the actionable verb most appropriate for that intended outcome.
- If you have a large number of second-level headings (H2s) in a section, consider whether all of these concepts are really integral to mastery of the TLO.
 - Any concept that doesn’t quite meet that standard can be demoted to a third-level head (H3).
 - Any concept that seems truly extraneous to mastery of the TLO can be moved into a boxed feature or cut outright from the section, thereby streamlining focus and reducing cognitive load.

¹ From Wilson and Giddens, *Health Assessment for Nursing Practice*, 6th Edition, Chapter 1, page 3

Additional Items to Consider as You Create Learning Objectives

- If you have existing LOs that aren't aligned to main section headings (H1s), assess whether the LO is an important takeaway for the chapter.
 - If so, align the LO to a main section heading (H1) as a TLO.
 - If not, consider demoting the LO to an ELO or removing the LO outright.
- If you have a second-level heading (H2) that is not important enough to have an associated ELO—that is, it is not necessary for the mastery of the main section TLO, demote the heading level from a second-level heading (H2) to a third-level heading (H3).
- If you have important material in a third-level heading (H3), elevate the heading level from an H3 to a second-level heading (H2) and create a distinct ELO for that material. *Note that H3s may not require an ELO.*
- Avoid having only one H2 or H3 within any given section. (That is, sections should contain at least two heads of each type if they have any heads at all.)
- If you have core material in a boxed feature, elevate the feature to a second-level heading (H2) and create a distinct ELO for that material.
- If you have a learning objective that is cumulative across a chapter--included in multiple main sections--consider how this LO can be made more granular in scope (appropriately and fully divided) by creating effective TLOs for each of the main section headings (H1s). The mastery of each TLO in the chapter should account for the cumulative goal of the original learning objective.

Creating a Learning Framework: Each Section Is a Digital Lesson

In textbooks, lessons are delivered in the form of chapters. But digital learning environments are often more granular. Students using digital learning tools are often doing so asynchronously; they are absorbing, practicing, and self-assessing on their own in short spurts of time.

In digital, **each section of a chapter is a self-contained lesson that students can interact with and learn from on their own.** Therefore, digital lessons are developed with a discrete, singular focus in mind. This is why enabling learning objectives (ELOs) are so critical. ELOs drive the content within a digital lesson.

Understanding each section in this way might prompt you to re-evaluate your heading structure, or “concept hierarchy,” to ensure that each section—both the broad Terminal Learning Objectives and the subordinate Enabling Learning Objectives—is appropriate in terms organization, granularity, and length.

Clustering, chunking, and proportionality are things to keep in mind when structuring each section in a chapter.

Clustering

In instructional design, clustering and chunking are sometimes used interchangeably. For our purposes, however, we’ll separate the two. We can think of the organization of the main sections in terms of clustering, and think of the subsections in terms of chunking.

For both print and digital learning, **it is important to consider how concepts can be clustered in a meaningful way.** **Clustering** makes better use of working memory because we learn more effectively when we can make associations among concepts:

- For example, it’s easier to consolidate and recall three items that we can relationally cluster into a single category than three items from disparate categories.
 - “Knife,” “spoon,” and “fork,” is easier to recall than “spoon,” “field,” and “orange.”
- For the former we have a pre-existing category we can access for all three items, whereas for the latter we have to try to construct a relatable category. This additional step adds to cognitive load.

The same applies with concepts in a textbook. **It’s easier for students to absorb and retain information that is clustered into three or four meaningful categories than if the concepts are discussed in one long, seemingly unrelated string.**

An Example of Clustering

Consider the following example of before clustering and after clustering:²

Original Heading Structure

Chapter Title: **Drug Development and Ethical Considerations**

Section Headings:

H1: Core Ethical Principles
H1: American Nurses Association Code of Ethics
H1: Drug Standards and Legislation
H1: Nurse Practice Acts
H1: Canadian Drug Regulations
H1: Initiatives to Combat Drug Counterfeiting
H1: Drug Names
H1: Over-the-Counter Drugs
H1: Drug Resources

With nine main section headings (H1s), this chapter would translate into nine separate lessons in a digital product. Such a high number of lessons might make it more difficult for students to comprehend and for developers to produce.

In this example, lessons that are distinct might actually be related, so this increases the cognitive load on students to make connections that could be done for them with more effective organization.

A heading structure and organization that takes a more clustered approach would help resolve both issues.

Revised Heading Structure with Clustering

Chapter Title: **Drug Development and Ethical Considerations**

Section Headings:

H1: Ethics
 H2: Core Ethical Principles
 H2: American Nurses Association Code of Ethics
H1: Drug Standards and Regulations
 H2: US Drug Standards and Regulations
 H2: Canadian Drug Regulations
 H2: Nurse Practice Acts
 H2: Initiatives to Combat Drug Counterfeiting
H1: Drugs
 H2: Drug Names
 H2: Over-the-Counter Drugs
 H2: Drug Resources

In this revised version, associated ideas have been clustered together under three main section headings (H1s), reducing nine separate lessons to three. This makes it easier for students to absorb and for producers to develop digitally.

- Sometimes clustering might be accomplished by creating a broader heading to subsume existing sections, as was done to cluster “Ethics,” “Drug Standards and Regulations,” and “Drugs” in the example above.

² Adapted from *Pharmacology*, Chapter 1.

- Of course, there will also be times when the existing section can't be clustered and should continue to stand alone, as in the "Objectives and Phases of Pharmaceutical Research" heading in the above example.

Chunking

Chunking is the segmenting of content into clear, digestible units. Like clustering, **chunking makes better use of working memory by reducing cognitive load because important information is made more readily apparent and therefore accessible.**

Chunking can help learners better absorb and contextualize an abundance of information. **The more information can be chunked out for learners, the more it will reduce cognitive load and the more easily students will be able to absorb it.** For example, let's say learners are presented with a list of psychiatric disorders to learn, such as the following:

Panic disorder
 Agoraphobia
 Generalized anxiety disorder (GAD)
 Autism spectrum disorder (ASD)
 Attention-deficit/hyperactivity disorder (ADHD)
 Unspecified intellectual disability
 Major depressive disorder
 Bipolar disorder
 Cyclothymia
 Anorexia nervosa
 Bulimia nervosa
 Binge-eating disorder

Their ability to memorize these disorders and better understand how they relate to specific symptoms will be improved by presenting them in more coherent chunks, such as the following:

Anxiety disorders

- Phobias
- Panic disorder
- Generalized anxiety disorder (GAD)

Neurodevelopmental disorders

- Autism spectrum disorder (ASD)
- Attention-deficit/hyperactivity disorder (ADHD)
- Unspecified intellectual disability

Mood disorders

- Major depressive disorder
- Bipolar disorder
- Cyclothymia

Eating disorders

- Anorexia nervosa
- Bulimia nervosa
- Binge-eating disorder

Here is another example of chunking, this time showing a selection of text before and after chunking.³

Main Section Without Chunking

CONSIDERATIONS FOR THE ADOLESCENT PATIENT

TLO: Describe the primary considerations needed to provide effective care for adolescents.

Adolescent patients need individualized nursing care specific to their developmental stage. Age-oriented developmental considerations include physical changes, cognitive level and abilities, emotional factors, and impact of chronic illness. Physically, adolescence is a highly diverse period of growth and development. Growth rates during these years may be affected by nutrition, factors within the environment, genetics and heredity, and gender. A group of adolescents of similar ages may manifest very different sizes, height-to-weight proportions, timing of secondary sex characteristics, and other indicators of physical maturity. These differences may warrant individualization of drug dosage based on weight or body surface area, even when the adolescent meets or exceeds the size of standard adults.

For example, an adjustment may be required in the dosage of a lipid-soluble drug because of the changes in lean-to-fat body mass, especially in young adolescent males, that coincide with physical maturation. Hormonal changes and growth spurts may necessitate changes in drug dosages; many children with chronic illnesses require dosage adjustments in the early teen years as a result of these transitions. Sleep requirements and metabolic rates may greatly increase during the teen years, along with appetite and food consumption, which may affect the scheduling of and response to drugs. Although adolescents' physical appearance and organ structure and function resemble those of adults, their bodies continue to grow and change; this requires increased vigilance in monitoring therapeutic and toxic drug levels.

The cognitive level and abilities of adolescents may pose additional considerations. Cognitive theorists have posited that adolescents progress from concrete to abstract reasoning. Individuals who are still in the concrete operational stage may have difficulty comprehending how a drug exerts its effects on the body and the importance of meticulous dosing and administration. Adolescents may also have difficulty understanding such concepts as drug interactions, side effects, adverse reactions, and therapeutic levels. For example, the patient taking birth control pills may or may not be able to comprehend the reduced action of birth control pills caused by antibiotics taken during an acute infection and may fail to take extra precautions to prevent pregnancy.

An understanding of the adolescent brain and the ongoing development of social, reasoning, and decision-making skills can be used to guide nursing assessment and interventions with the pediatric patient. As adolescents learn to reason in an abstract manner, teaching may be based on more complex information. Potentially, adolescent perception of invulnerability and difficulty relating future consequences to current actions may dictate that the nurse adapt teaching to address specific adolescent thought processes. An adolescent who is told that an insulin injection schedule must be adhered to in order to avoid long-term complications may not understand the rationale for treatment if it is only substantiated by abstract, future-oriented risks. The same patient may find the relationship between using insulin to maintain normoglycemia and the ability to participate in sports more immediate and relevant. Allowing the adolescent to verbalize concerns about the drug and its regimen may offer opportunities for clarifying misconceptions and teaching new concepts.

Emotional development of the adolescent also occurs on an individual basis. The adolescent years are characterized by sensation seeking, risk taking, questioning, formation of identity, and increasing influences exerted by peer groups. To avoid potential drug interactions, the nurse should assess for high-risk behaviors that include use of alcohol, tobacco, and recreational drugs. Other issues, including sexual practices and stressful family and social situations, may affect the patient's response to drugs. Nurses must be respectful of the emotional needs of adolescence while attending to the mental health issues that may surface during these years. A comprehensive history must be solicited from adolescent patients to ensure appropriate drug administration. The nurse must also be conscious of the need to exercise care in offering confidentiality in the event that information needs to be divulged to other health care providers, family members, or caregivers to ensure patient safety.

As adolescents attain greater levels of independence from their parents, self-care behaviors increase. The nurse should assess the patient's abilities to self-administer drugs and monitor therapeutic and adverse reactions. Adolescents spend less time with family members and caregivers and may need increased instruction about their drug regimen and the key observations that are needed. Although adolescents frequently display "breaking away" behaviors in response to parental bonds, they often continue to use family members or caregiver drug habits as models for their own drug behaviors. For the pediatric patient with a chronic illness, issues may change during adolescence. Engaging peers in the plan of care for drug administration, allowing the adolescent to make safe choices and have flexibility within that plan, setting up mutual drug contracts, and permitting the patient to design their own adult-monitored drug regimen may facilitate adherence. The nurse can facilitate required adaptations and support both the patient and family members during these times.

³ From *Pharmacology*, Chapter 5, pages 48–49.

Main Section with Chunking

CONSIDERATIONS FOR THE ADOLESCENT PATIENT

TLO: Describe the primary considerations needed to provide effective care for adolescents.

Adolescent patients need individualized nursing care specific to their developmental stage. Age-oriented developmental considerations include physical changes, cognitive level and abilities, emotional factors, and impact of chronic illness.

Physical

ELO: Identify the physical factors of adolescence that should be considered to provide effective nursing care.

Physically, adolescence is a highly diverse period of growth and development. Growth rates during these years may be affected by nutrition, factors within the environment, genetics and heredity, and gender. A group of adolescents of similar ages may manifest very different sizes, height-to-weight proportions, timing of secondary sex characteristics, and other indicators of physical maturity. These differences may warrant individualization of drug dosage based on weight or body surface area, even when the adolescent meets or exceeds the size of standard adults.

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Cognitive

ELO: Describe the cognitive factors of adolescence that should be considered to provide effective nursing care.

The cognitive level and abilities of adolescents may pose additional considerations. Cognitive theorists have posited that adolescents progress from concrete to abstract reasoning. Individuals who are still in the concrete operational stage may have difficulty comprehending how a drug exerts its effects on the body and the importance of meticulous dosing and administration. Adolescents may also have difficulty understanding such concepts as drug interactions, side effects, adverse reactions, and therapeutic levels. For example, the patient taking birth control pills may or may not be able to comprehend the reduced action of birth control pills caused by antibiotics taken during an acute infection and may fail to take extra precautions to prevent pregnancy.

An understanding of the adolescent brain and the ongoing development of social, reasoning, and decision-making skills can be used to guide nursing assessment and interventions with the pediatric patient. As adolescents learn to reason in an abstract manner, teaching may be based on more complex information. Potentially, adolescent perception of invulnerability and difficulty relating future consequences to current actions may dictate that the nurse adapt teaching to address specific adolescent thought processes. An adolescent who is told that an insulin injection schedule must be adhered to in order to avoid long-term complications may not understand the rationale for treatment if it is only substantiated by abstract, future-oriented risks. The same patient may find the relationship between using insulin to maintain normoglycemia and the ability to participate in sports more immediate and relevant. Allowing the adolescent to verbalize concerns about the drug and its regimen may offer opportunities for clarifying misconceptions and teaching new concepts.

Emotional

ELO: Describe the emotional factors of adolescence that should be considered to provide effective nursing care.

Emotional development of the adolescent also occurs on an individual basis. The adolescent years are characterized by sensation seeking, risk taking, questioning, formation of identity, and increasing influences exerted by peer groups. To avoid potential drug interactions, the nurse should assess for high-risk behaviors that include use of alcohol, tobacco, and recreational drugs. Other issues, including sexual practices and stressful family and social situations, may affect the patient's response to drugs. Nurses must be respectful of the emotional needs of adolescence while attending to the mental health issues that may surface during these years. A comprehensive history must be solicited from adolescent patients to ensure appropriate drug administration. The nurse must also be conscious of the need to exercise care in offering confidentiality in the event that information needs to be divulged to other health care providers, family members, or caregivers to ensure patient safety.

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The main text in the unchunked passage and the chunked passage is the same. But the chunked passage produces two benefits:

- The **additional headings spotlight the primary takeaways for the student** and serve as signposts throughout that keep students focused on what they're reading.
- The new subsections with associated ELOs allow for digital lesson transformation, as each subsection can be **transformed into discrete and measurable lessons to help achieve students achieve mastery of the broader TLO.**

In this example, the three discrete digital lessons would be:

- Physical Considerations for the Adolescent Patient
- Cognitive Considerations for the Adolescent Patient
- Emotional Considerations for the Adolescent Patient

Other Methods of Chunking and Avoiding Cognitive Overload

Sometimes chunking can be accomplished as it was in the example above by breaking long narrative passages into more granular, digestible units. **The goal of chunking is to make the text easier for students to digest.** In both print and digital environments, this means breaking up the text to make it more readable. Here are some other ways to accomplish chunking and avoid cognitive overload:

- **Use bulleted and numbered lists:** This makes text easier for students to process and digest. Numbered lists are used when you're presenting a sequence of steps. Bulleted lists are used for other non-sequential lists.
- **Use tables:** Tables help to present a great deal of information in a small space and provide a visual break for students.
- **Create short paragraphs:** Shorter paragraphs, especially in a digital environment, aid in student learning.
- **Be concise:** Related to using shorter paragraphs, being concise helps students avoid cognitive overload.

For example, consider the following side-by-side examples. The use of bullets to chunk the material on the right helps students better process the material.

The diagram illustrates the process of chunking text. On the left, a light blue box contains a paragraph of text under the heading "Physical". An orange arrow points from this box to a second light blue box on the right. The second box shows the same text, but with a bulleted list inserted to break up the paragraph, making it easier to read.

Physical
ELO: Identify the physical factors of adolescence that should be considered to provide effective nursing care.
Physically, adolescence is a highly diverse period of growth and development. Growth rates during these years may be affected by nutrition, factors within the environment, genetics and heredity, and gender. A group of adolescents of similar ages may manifest very different sizes, height-to-weight proportions, timing of secondary sex characteristics, and other indicators of physical maturity. These differences may warrant individualization of drug dosage based on weight or body surface area, even when the adolescent meets or exceeds the size of standard adults.

Physical
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- nutrition,
- factors within the environment,
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The main idea is to be mindful of the importance of granularity for students who will be engaging with the content in a digital environment. **The clearer the chunking in the textbook, the easier it will be for students to learn from in digital formats.**

Proportionality

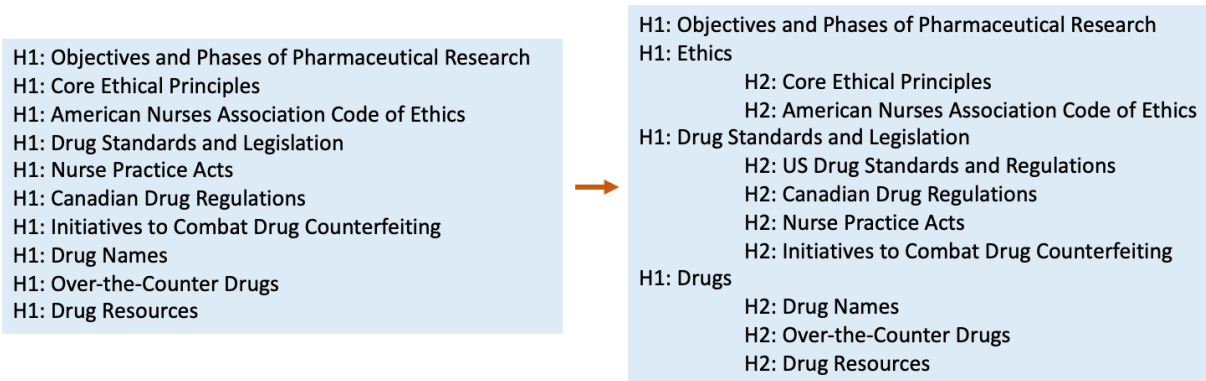
It's also helpful to keep the notion of **proportionality** in mind. Similar to how you might keep chapters within a certain page range, you want to be aware of how long sections are. Chapter lengths vary slightly but tend to be approximately the same length across a text. The same principle should apply for section lengths.

Sections should be loosely proportional to each other in length. In the digital environment, length often translates to **time-on-task**—that is, how long a student spends on a particular lesson. If one lesson takes 5 minutes but the next takes 25, students might become overloaded and frustrated.

Keeping proportionality in mind as you write and revise chapters will also help you with clustering and chunking content:

- If there are a few very short sections in a row, for example, they might be candidates to be clustered together into a single longer section.
- If a sub-section is exceedingly long, you might want to chunk it into shorter, more proportional subheads with additional ELOs.

Consider the earlier example in which ten separate main section headings (H1s) were clustered into four main sections:



Much of this was done by clustering very brief related main sections into a broader category.

- See the section on “Drug Standards and Legislation” in the right box.
 - It's made up of one new section heading (“US Drug Standards and Regulations”) and three existing and relatively short section headings—“Canadian Drug Regulations,” “Nurse Practice Acts,” and “Initiatives to Combat Drug Counterfeiting.”
 - Whereas these sections would originally comprise insufficient or inadequate digital lessons singularly, they now work more effectively in a digital lesson as smaller enabling lessons under the broader category of “Drug Standards and Legislation.”

Here you can see that these would originally have been very short main (H1) sections:

2007: Food and Drug Administration Amendments Act

This act allows the FDA to do more comprehensive reviews of potential new drugs, mandates postmarketing safety studies, and affects the distribution of drugs found to be not as safe as premarket studies indicated.

NURSE PRACTICE ACTS

All states and territories have rules and regulations in place to provide guidance and govern nursing practice, which includes drug administration by nurses. Generally, nurses cannot

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UNIT I Introduction to Pharmacology

prescribe or administer drugs without a health care provider's order. Practicing nurses should be knowledgeable about the nurse practice act in the state where they are licensed. (Information can be found through the National Council of State Boards of Nursing at www.ncsbn.org.) Nurses are responsible for knowing their state's law and administrative code. Nurses who administer a drug without a licensed health care provider's order are in violation of the Nurse Practice Act and can have their licenses revoked.

In a civil court, the nurse can be prosecuted for giving the wrong drug or dosage, omitting a drug dose, or giving the drug by the wrong route.

CANADIAN DRUG REGULATION

In Canada, prior to approval and becoming available to patients, drugs must be reviewed for safety, efficacy, and quality by the Health Products and Food Branch (HPFB) of Health Canada. Health Canada is a federal department tasked with the mission of improving the quality of life of all Canadians. (Further information can be found at www.hc-sc.gc.ca.)

In 1996, the Canadian government passed the Controlled Drugs and Substances Act. This act broke controlled drugs and substances into eight schedules and two classes of precursors (Table 1.2). In 2012, the Safe Streets and Communities Act was passed in Canada, which reclassified amphetamines—including methylenedioxymethamphetamine (MDA) and methylenedioxy-methamphetamine (MDMA)—and also flunitrazepam and gamma hydroxybutyrate (GHB) from Schedule III to Schedule I drugs. This change imposed stiffer penalties for dealers and those in possession.

INITIATIVES TO COMBAT DRUG COUNTERFEITING

Distribution of counterfeit drugs is a worldwide problem; it is estimated that more than 10% of all drugs available are counterfeit. Counterfeit drugs may contain the incorrect ingredients, insufficient amounts of active ingredients, or no active ingredients. Additionally, they may contain impurities and contaminants or may be distributed in fake packaging.

The most common drugs counterfeited are those used to treat erectile dysfunction, high cholesterol, hypertension, infections, cancer, and HIV/AIDS. The high cost of drugs, combined with the need for prescription drugs to treat chronic diseases—as well as the desire by consumers to misuse drugs (e.g., steroid-containing drugs for body building)—generate a constant demand easily filled by criminals via rogue Internet drug sites. The FDA and consumer groups are working on strategies to combat this problem, including tougher oversight of distributors, a rapid alert system, and better-informed consumers.

The role of the nurse is critical in consumer education. The nurse must advise patients to report any differences in taste or appearance of a drug or in its packaging. Patients should be alert to slight variations in packaging or labeling (e.g., color, package seal), note any unexpected side effects, and buy drugs from reputable sources. Reputable online pharmacies carry the designation of Verified Internet Pharmacy Practice Site (VIPPS; a list of VIPPS-verified pharmacies can be found at www.nabp.net) and display an approval seal. If any suspicion of counterfeit arises, the patient, family, or nurse should contact the FDA at www.fda.gov/Safety/MedWatch/HowToReport.

Factors to Consider When Clustering/Chunking/Considering Proportionality

- If some sections are disproportionately short or long relative to most other sections at a given level, use clustering or chunking to help align your sections and subsections for optimal learning and time-on-task in digital formats.
- When looking at the page, if paragraphs are very long and hard for students to parse, consider splitting long paragraphs into multiple shorter paragraphs.
- Look for ways to break up the text with bulleted lists or numbered lists to reduce cognitive load.
- Determine whether key concepts are buried in paragraphs that would stand out more in a bulleted or numbered list.
- Move complex and detailed information into a table when possible.

PART II: OTHER FEATURES AND FORMATTING

Creating Key Terms with Digital in Mind

Key terms are a core part of any textbook pedagogy. The key terms in a text are the most important concepts for students to learn. However, key terms have an even greater significance as textbook content is transformed into digital lessons. In most digital environments, students' mastery of a lesson is in part determined by their mastery of the key terms in that lesson. In short, **key terms in digital are a critical component to measure, evaluate, and help remediate student understanding.**

Digital developers rely on a lesson's key terms to decide what content is produced and what assessments are created. Here, the notion of proportionality comes back into play:

- If there is an excess of key terms in a particular subhead, the content generated around those terms will also become excessive and exceed the optimal time-on-task for students.
- Conversely, if a lesson has no key terms, students (and digital developers) will struggle to understand what the critical takeaways are.

Factors to Consider When Creating Key Terms

If a section has an abundance of key terms:

- If additional chunking would help students more easily see and absorb each concept, break up text with additional subheads.
 - For terms worthy of a lesson, chunk under-second level (H2) headings and create an accompanying Enabling Learning Objective (ELO) for the new section.
 - For terms that could benefit from additional chunking but are not worthy of an ELO, create additional third-level (H3) heads to better indicate their importance.
- Determine whether each of the terms is critical to the lesson's learning objective. If not, remove these key terms.
 - For terms that are good to know but not critical to the lesson, simply unbold the key term.
 - For terms that feel extraneous to the lesson objective, consider cutting them from the text.

If a section has very few or no key terms:

- Determine concepts that are in fact core to a lesson and therefore should be key terms. Bold those terms that are core to the lesson. For any newly bolded terms, determine if creating a new H2 would help reinforce its importance to students.
- If adding key terms isn't warranted, consider if the section is perhaps extraneous. Cut sections that don't directly inform the lesson objective. Such streamlining reduces cognitive load and improves student retention of core material.

Selecting Photos and Figures with Digital in Mind

In print textbooks, it's typically better to strive for quality of images (photos and figures) over quantity. The same applies in digital formats. **Photos and figures should serve to highlight, reinforce, or explain key concepts.** Extraneous art that doesn't serve any of these functions only adds to cognitive load and diminishes student learning.

Similarly, according to learning theory, **simpler is more effective for learning than complex.** So while it may be tempting to obtain or create a more elaborate figure, it's likely that the additional bells and whistles will detract from the reason you chose to use art in the first place.

The more your art in your textbook adheres to the following best practices, the more seamlessly it will be implemented in digital lessons.

Best Practices for Effective Use of Images

Below are some best practices guidelines for effective use of images in both print and digital environments:

- **Choose quality over quantity and avoid “decorative” photos.**
 - Photos must clarify/support the text or show real-world examples of key concepts described in the text.
- **Choose simple figures over complex figures when possible.**
 - Figures should display enough information to satisfy the objective without being overwhelming or distracting.
- **Use graphics to show relationships and processes and to make the abstract concrete when possible.**
 - The more visual you can make the text, the better students will be able to parse it.
- **Integrate text within graphics when possible.**
 - Students learn more when the text they need to read to understand a figure is embedded in the figure itself rather than as a caption only.
- **When choosing photos, consider diversity and inclusion.**
 - Try to select photos that take diversity in age, gender, and ethnicity into account so that the text best reflects the actual student population.
- **Add descriptive titles or captions to all images.**
 - Descriptive titles or captions should help explain the context and function of the images.
- **Choose images that are authentic and timely, especially as pertains to medical equipment and processes.**
 - Dated photos undermine the credibility of the text.
 - Data in figures should be as up-to-date as possible.
 - If using screenshots, be sure to avoid including dates more than a year old unless there is explicit reason to do so.
- **Place photos right next to the point they are illustrating.**
 - Indicate to digital producers exactly where you want a photo to appear so that it best illuminates the chapter content.
- **Refer to all figures in the text.**
 - Call students’ attention to all figures with a line of text such as:
 - Figure 1.4 explains...
 - See Figure 1.4 for...
 - As shown in Figure 1.4...
 - Doing so helps students better make use of the figure and also indicates to digital producers where the figure should be placed.

You’ve probably heard about the importance of textbook content being **accessible**—that is, able to be accessed by students of all physical abilities. When making photo and figure selections, make choices with accessibility in mind. For example, simpler images with captions that clearly explain the image help with accessibility. This is because in digital environments, “alt text” is created so that students with visual challenges who use text-to-speech tools can still have a complete learning experience.

Submission and Technical Requirements

Please submit figures as separate files from the chapter manuscript file. (Don’t embed images in your chapter file.) The following are additional requirements to keep in mind.

Borrowed Elsevier Figures

For figures to be borrowed from Elsevier textbooks or journals, please provide the detailed source information, including the original figure number and page number. It can also be helpful if you submitted a picture or screenshot of the figure as a PDF or image file.

Borrowed Non-Elsevier Figures

For figures to be borrowed from non-Elsevier textbooks or journals, please provide the detailed source information, including the original figure number and page number. Because we cannot always access non-Elsevier materials, you should also submit a picture or screenshot of the figure as a PDF or image file.

Original (Author-Created) Figures

	Acceptable	Not Acceptable
For Photos	<ul style="list-style-type: none"> • TIFF files (300 dpi) • JPG files (300 dpi) • Adobe Illustrator EPS files (300 dpi) • Photoshop EPS files (300 dpi) • High-quality glossy prints 	<ul style="list-style-type: none"> • PDF files • PowerPoint files • MacDraw or paint program files • Art merged with Microsoft Word or WordPerfect programs
For Algorithms, Diagrams, and Other Illustrations to Be Created	<ul style="list-style-type: none"> • Computer-generated or hand-drawn sketches with necessary labels and instructions for our artists to recreate • PowerPoint • PDF 	