

Structured Pedagogy

GUIDE 3

Curriculum and Scope and Sequence Development for Literacy and Numeracy



INTRODUCTION

This guide discusses the steps involved in examining the existing national curriculum and developing a scope and sequence. This fundamental process occurs before anyone writes literacy and numeracy materials, so that the content is contextualized, reflects country-level standards, and is developmentally appropriate.

National curricula vary across countries. Some provide lists of skills that children should be able to do by the end of the school year. Others include high-level concepts that show objectives organized by grade spans. Some curricula include activities, or ways children demonstrate proficiency; and still others contain when to teach and for how long, often referred to as pacing guidelines or curricular frameworks. In some contexts, the term “curriculum” includes the set of textbooks, teacher guides, and supplementary materials. The definition of curriculum includes:

WHAT: The skills children are expected to know at the end of each school year

WHEN: Guidance on pacing and how to distribute the skills throughout the school year

HOW: Textbooks, supplemental materials, teacher’s guides, suggested instructional activities, and information on how instruction should look

(Note: Curricula vary by countries, so not all will have the what, when, and how that we describe, and some countries may have information not included in the definition.)

The first section—Step 1—covers learning about the existing curriculum, which has to happen before structured pedagogy program decisions (Step 2) are made with government officials. These two steps, in turn, must precede development of a scope and sequence (Step 3).

Scope refers to the breadth and depth of content knowledge and skills to be covered. **Sequence** refers to how content knowledge and skills are ordered and presented over time. Thus, a **scope and sequence** is a document that lists the skills that children learn each day and week. It is based on the curriculum and steers the writing of a textbook and teacher’s guide. This “map” for developing textbooks and teacher’s guides helps ensure that the produced materials address the intended skills and are consistent.

Figure 1 presents the three key steps for collaboration with government.

FIGURE 1.
Three
collaboration
steps





STEP 1. LEARN THE CONTEXT

What is the context affecting the curriculum that students are expected to learn? Answers to this essential question may come from the curriculum department, from curriculum documents detailing the expected student skills, and from teachers. Learning the context (i.e. Step 1) is critical for success, so plan for it.

Learn from the Curriculum Department

For sustainability, and in the interest of a positive partnership, collaborate where the curriculum is conceived and developed. Meet with the curriculum department at the Ministry of Education or other relevant entity to learn their priorities and goals and how the curriculum was developed. Listen to their perceptions of the existing curriculum and what they identify as its strengths and weaknesses. Learn their process of materials development and where they are in the curriculum review cycle. Learn their interest in interim adjustments to address learning outcomes. Invite members of their team to collaborate in a review of the expected student skills and any inputs contributed by teachers (See below).

Learn from Curriculum Documents What Student Skills Are Expected

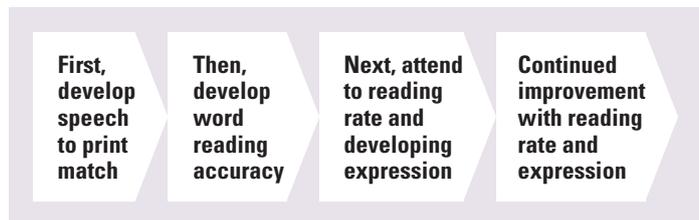
Have literacy or numeracy experts examine the existing curricula by grade and assess whether and when the skills needed for student growth are included. These documents may include standards, pacing frameworks, textbooks, teacher's guides, and supplemental materials. Core elements that are desired include:

For literacy—

1. Presence of print knowledge, phonological awareness, alphabets, fluency, vocabulary, comprehension, and writing (See Background to Literacy Concepts on page 6)
2. Developmental progressions, with content becoming systematically more difficult at a reasonable pace (See Figure 2)
3. Varied text interactions (teacher read-alouds, decodable text¹, stories, informational narratives, poetry)
4. Linkages among oral language, reading, and writing content
5. Use of a familiar language to children and approaches to support those who are learning in an additional language

1. Books and passages with a concentration of words using spelling patterns that students have been taught to read. They help to improve reading accuracy.

FIGURE 2. Reading fluency progression in the early grades



For numeracy—

1. Inclusion of all domains in foundational mathematics (numbers, operations, algebra, measurement, geometry, spatial awareness, and statistics and data analysis)
2. Clear developmental progressions within and across all domains (See Figure 3)
3. Focus on both conceptual understanding and procedural skills (e.g., initial emphasis on the meaning of addition will lead to automaticity of basic facts)
4. Progression from concrete to pictorial to abstract within domains (See Figure 4)

FIGURE 3. Developmental progressions for numeracy

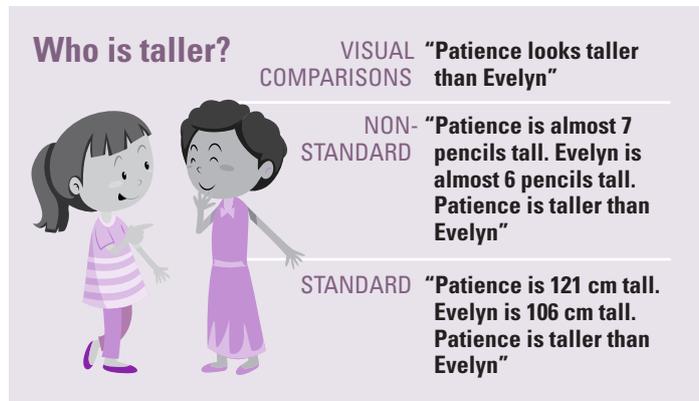
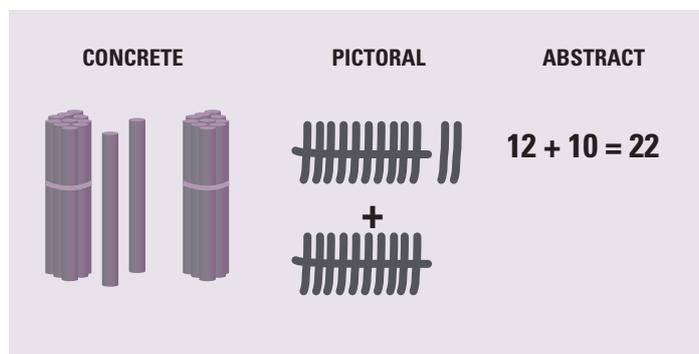


FIGURE 4. Stages of progression for numeracy





Learn from Teachers

Teachers will have been using the existing curriculum, including any accompanying materials, so learning from them will be informative. Seek out their voices and know what they are doing, so that any suggested changes will be more credible and effective.

Observe the Teachers

Learn what teachers do well, what they do frequently, and what is missing. Prepare to use their existing pedagogy as a bridge to new methods that will be included in the new materials. Building from their existing methods will increase uptake of the new structured pedagogy and it will be cultural responsive. For example, teachers might regularly start the class by singing or by counting the number of children. Exercises like these help to develop oral language and number sense, respectively. Yet these practices could be adjusted slightly to improve outcomes. For example, showing a print version of the song would help children develop a concept of word within a text. And instead of only counting, new concepts such as addition could be introduced (e.g., How many girls? Boys? How many altogether?).

Examine how skills are taught in the various grades across both literacy and numeracy. Measure the time devoted to each skill and how lessons are organized (e.g., handwriting is needed but it should not dominate the time allocated to writing). Understand the instructional practices (e.g., discussion, repetition, independent practice) and grouping (e.g., whole class, small group, individual) used. Learn the extent to which universal design principles are applied to make content accessible for all students. Watch for adjustments to instruction via informal assessment.

In literacy observations, learn:

- The explicitness of decoding strategies (e.g., A teacher says, "These two letters, s h [pointing to the two letters], work together to make one sound /sh/)
- Teacher's use of a child-friendly language for explanations
- Skills applied in reading and writing

In numeracy observations, learn:

- The use of teacher and student explanations of how a problem was solved
- How mathematical models are used
- The strength of the link between formal and informal mathematics

After the observations, interview teachers as experts. Listen to them describe the parts of the curriculum or textbook they like and use confidently. Ask them to identify where they want more support. For example, some teachers may express interest in a method that they learned in teacher college but have never used since (see Textbox 1). Ask questions to

TEXTBOX 1

SAMPLE INPUT FROM TEACHERS: PHONICS

Prior to creating an intervention with structured pedagogy, teachers who would use the new materials were interviewed and they expressed appreciation for phonics with comments such as, "The moment they acquire skills on sounds, their problem is solved." Yet, despite this appreciation, many teachers did not include phonics because, "Phonics is not in the books that I use." (Dubeck, Jukes, and Okello, "Early Primary Literacy," 2012, 56–57)



understand the culture of the classroom, such as how they characterize successful students. Encourage specificity, referring to the lesson just observed. Learn how teachers plan lessons and the extent they follow the curriculum and requirements. For example, some teachers may reduce the allotted time for a subject because they want to devote more time to a skill their students need. In other words, aim to learn whether they adjust for skills or content that might be lacking in the curriculum and whether lesson planning is meaningful or a burden.



STEP 2. DECIDE

Following the pedagogical review in the learning step, prepare to make a series of informed decisions about the skills to include and their pacing throughout a school year. The decisions will involve both major structural issues and specific content.

Structural Decisions

Engaging the Ministry of Education (or other relevant body) is necessary for making informed structural decisions. First, consider the approaches suggested in Guide 1 on government leadership and teacher adoption, regarding the need to listen more than speaking. Begin by asking questions and hearing the official's perspectives. Only after that, share what was learned in Step 1 from the skill review, the teacher observations, and interviews. Introduce global standards (e.g., the Global Proficiency Framework), or regional ones, noting descriptors by grade. Then provide an orientation to literacy or numeracy methodologies and ways to achieve some of the standards through curriculum adjustments. Decide together whether new materials will be created. If yes, continue to define the parameters.

Multiple structural decisions will guide the rest of the scope and sequence process:

1. First, decide the **grade levels** to address. If multiple grades, decide whether the new materials will be introduced concurrently or in succession.
2. Determine whether the **languages** will be the existing ones or new ones, and used as the language of instruction for all subjects or taught as bilingual program. The use of an international language, a regional lingua franca, a local language, or multiple languages all have benefits and challenges that the new materials will amplify. (See forthcoming guide dedicated to language for a full discussion.)
3. Next, prioritize the **proficiencies** that the new materials will address (e.g., by the end of grade 1 children will know the sounds associated with letters of the alphabet; by the end of grade 2, children will be able to add and subtract numbers up to 20). Then establish the minutes per day and week for literacy or numeracy instruction. Ask the Ministry if any additional time in the instructional calendar could be devoted to literacy or numeracy.
4. Finally, agree on the **materials** that will be developed. Advise that starting simple (e.g.,

student textbook and teacher's guide) is the best way to engage teachers. Supplemental materials can follow. Choose the level of guidance offered in the materials, suggesting that scaffolded daily lessons with steps on how to do an activity are the ideal support for teachers using new pedagogies.

Content Decisions

With the major decisions about the structure settled, it is time to make content decisions. First, assemble a small team (e.g., 5-7 people per subject and grade) who will develop the scope and sequence. Members can be drawn from the curriculum department; academia; early grade teachers; and technicians with literacy, numeracy, curriculum, assessment, or language expertise. Ensure that the team is appropriately sized for making decisions efficiently.

The team's first task is to establish guiding principles that will set the tone, help to maintain the instructional objectives, and serve the material

TEXTBOX 2: Guiding principles

For literacy:

- Determine which skills will be taught and their frequency each week.
- Establish parameters to ensure consistency and appropriate increases of difficulty (e.g., quantity of new letters, decodable words, sight words, and vocabulary per week; and word, sentence, and story length).
- Agree on sources for content. Existing standards with themes or topics can be referenced (copyright permitting) or new content can be created.
- Identify desired pedagogical activities to be further refined by the writers.

For numeracy:

- Group any aligned skills together (e.g., number recognition and object counting).
- Develop pacing across and within domains, ensuring that concepts are revisited with depth (e.g., geometry is integrated throughout the year instead of blocked into one month).
- Develop mini-developmental progressions for objectives (e.g., the steps that lead to proficiency in addition and subtraction to 20 by the end of the year).
- Develop an activity bank using textbooks, teacher's guides, and resources from similar contexts. Choose manipulatives or resources that are easily obtainable so as not to overburden teachers. See Resources.



writers (see Textbox 2). Base the guiding principles on research, reflect other successful literacy/numeracy models, and add any missing skills that were noted during Step 1, learn the context. For each learning objective, a literacy or numeracy technical expert should compile and

be familiar with pertinent research specific to each for use in developing the scope and sequence (e.g., familiarity with the developmental progression for measurement of length). The substantial research science must guide all recommendations.

STEP 3. DEVELOP A LIVING SCOPE AND SEQUENCE

Learning the context (Step 1) and making the structural and content decisions (Step 2) provide a solid foundation for developing the scope and sequence (Step 3). We call the scope and sequence a “living” document because as writers begin to develop the instructional materials (see Guide 4, on materials), they will point out adjustments that need to be made to it.

Building the scope and sequence can begin as soon as the guiding principles are established. Between the guiding principles and the actual scope and sequence, expect to spend 6–8 days creating per grade level. The scope and sequence for multiple grade levels and languages can be created simultaneously, provided that there are enough qualified people, and that communication between teams is sufficiently close so that the content aligns and builds upon each other.

Logistics and Resources

Have one person create a file (ideally an Excel workbook) that presents the content decided in Step 2. One spreadsheet should list the skills, objectives, and themes (if used) and be organized by day, week, and term for the school year. Another spreadsheet will list the guiding principles, for easy reference. Institute protocols for version control, file naming, and updating to avoid duplication or loss of work.

In the meantime, gather sources for content. Word-level content used for phonics or vocabulary may come from the national curriculum, previously used instructional

materials, or reference books. A reading technician or linguist should provide linguistic information such as the alphabet, letter frequencies, lists of orthographic patterns, and syllable structures. For numeracy, gather relevant content sources, such as the national curriculum and textbooks.

Plotting of Content

Next, reassemble the same team that developed the guiding principles. Have them refer regularly to the principles to help maintain the original goals. They will populate the cells with content for the first week of the term but also look ahead to the last week of the term. Establish internal checks to verify that new content is not introduced abruptly or too slowly. Plan periodic reviews by quality assurance teams composed of literacy and numeracy experts or government officials.

Updating

Once the scope and sequence has been populated with some content, share it with the writers. They will, in turn, create and share more in-depth content (such as a story they write or a math activity they create) to be placed into the scope and sequence. To illustrate, Figure 5 is an example of a scope and sequence paired with the relevant page of the teacher’s guide.

As hectic as the writing process can be, we recommend that the scope and sequence be maintained and updated to serve as an accessible repository of all skills and content that are in the instructional materials.



FIGURE 5. One week of a scope and sequence and Day 1 from the numeracy teacher’s guide (Tayari, 2017)

DAY	Week 5				
	Day 1	Day2	Day3	Day 4	Day 5
NUMBERS					
2.2.1 Counting	Rote counting 1-20, count objects 1-10	Rote counting 1-20, count objects 1-10	Rote counting 1-20, story/song/poem	Rote counting 1-20	Rote counting 1-20, story/song/poem
2.2.2 Number Recognition	Number recognition 1-10	Number recognition 1-10			
2.2.3 Number Sequence					
2.2.4 Number Value	Matching objects with numerals 1-10 draw sets of objects 1-10	Matching objects with numerals 1-10 (using a ten frame) draw sets of objects 1-10 (using a			
2.2.5 Number Writing	Write 1-10	Write 1-10	Write 1-10		

Week 5 Day 1

Strand	Numbers
Sub-Strand	Counting, number recognition, number value, number writing
Specific learning outcomes	By the end of the lesson, the learners should be able to: (i) Recognize numbers 1-10. (ii) Draw sets of objects 1-10.
Suggested resources	Number cards 1-10 for each group, 10 counting objects for each group of learners
Suggested activities	Counting, singing, matching and drawing, number recognition game
Link to PCI	Parental involvement-bringing materials from home to make flash cards
Core competence	Self-efficacy-Taking turns in small group activities
Values	Patience as learners match and draw objects



Introduction

- Sing a number song.
- Rote count 1-20 with actions.

Main Activity

Matching and drawing

Whole class

- Demonstrate the following activity
- Provide 10 objects/counters from the environment.
- Put a set of number cards 1 to 10 in a container.
- Pick up a number card and ask or tell the learners the number.
- Guide them to get the same number of objects as the number on the number card.
- Draw corresponding number of objects from the board quickly and silently.
- Write the number next to the drawing. Show learners how to form the number correctly. Tell learners to practice writing the number in their site.
- With learners, repeat the steps with other numbers.

Small group

- Give each group 10 objects and a set of number cards with numbers 1-10 in a container.
- Guide learners to take turns picking one card at a time with eyes closed and count the corresponding number of objects.

Learners activity

- Refer learners to page 14 of their workbooks.
- Guide the learners to join the dots to write numbers 6,7,9 and then draw corresponding number of objects in their workbooks.

Conclusion

- Play a game with learners where you write 3 numbers on the board (6, 7, 9). Touch a number and ask the learners to show you the corresponding number of fingers.

TEXTBOX 3: Background to Literacy Concepts

Print knowledge is learning that sounds can be represented by symbols, it is meaningful, and has different purposes. Developing it includes:

- book orientation, directionality, space between words, purpose for reading, discussing title, purpose of punctuation, examining text structure

Phonological awareness is sensitivity to the sound structure of a language. It includes awareness of words in sentences, syllables, and individual sounds (i.e., phonemes). Learning to recognize the salient phonological unit for a language helps to learn to read words in it. Developing it includes:

- sentence segmentation, syllable blending, onset-rime, phoneme identification, phoneme blending/segmenting, rhyme, alliteration

Alphabetic is the evolution of knowledge of how letters (or symbols) and their patterns represent the sounds of a language. It is needed to read and spell words. It is best taught through systematic and explicit phonics instruction. Developing it varies by language but generally includes:

- sound/symbol (letter) correspondence, blending and segmenting syllables, blending words by sounds, by syllable and morphological unit

Fluency is ultimately the ability to read with accuracy, at a rate that demonstrates understanding and with expression. Developing it includes:

- finger pointing, making a speech to print match, attention to word reading accuracy, attention to improved reading rate, matching voice to the meaning of the text

Vocabulary, in general, is word knowledge. It supports understanding of text and writing ones’ own text. Developing it includes:

- word exploration, use in speaking and writing, classification and categorization of words

Comprehension is the process of simultaneously extracting and constructing meaning of written text. All of the concepts listed in this table contribute to it. Developing it includes:

- wide reading, vocabulary development, examining text structure, strategies

Writing has a reciprocal relationship to reading. Opportunities to write must begin from the onset of formal education. Developing it includes:

- spelling, handwriting, writing for meaning, writing to mimic



RESOURCES

Global Proficiency Framework containing minimum proficiency levels in reading and mathematics for grades 1-9:

- Reading: <http://tcg.uis.unesco.org/wp-content/uploads/sites/4/2020/10/WG-GAML-4-reading-4.1.1-Global-proficiency-framework.pdf>
- Math: <http://tcg.uis.unesco.org/wp-content/uploads/sites/4/2020/10/WG-GAML-4-mathematics-4.1.1-Global-proficiency-framework.pdf>

Technical reference document for numeracy, which explains key curricular and instructional focus areas: <https://shared.rti.org/content/instructional-strategies-mathematics-early-grades>.

Website for learning about learning trajectories in numeracy: <https://www.learningtrajectories.org/>

Tool for evaluating curriculum from a science of reading perspective: <https://www.thereadingleague.org/wp-content/uploads/2020/08/Curriculum-Evaluation-Tool-August-2020.pdf>

Blog on Creative Commons and Licensing and publishing quality in Africa and Asia: <https://www.globalreadingnetwork.net/learning/creative-common-and-open-source-licensing-resources-affect-publishing-quality-africa-and>

Complete Series of Structured Pedagogy How-To Guides: <https://scienceofteaching.s3.eu-west-3.amazonaws.com/index.html>

TECHNICAL EXPERTISE NEEDED



Linguist or language expert(s):

(one for each language): will play a key role from curriculum analysis through scope and sequence development process, as skill progression and development are highly language dependent.

Reading pedagogy: expert familiar with structured pedagogy reading curriculum and instructional practices, who can play a guiding role during curriculum analysis and scope and sequence development.

Math pedagogy: expert familiar with structured pedagogy numeracy curriculum and instructional practices, who can play a guiding role during curriculum analysis and scope and sequence development.

REFERENCES

- 1 Dubeck, Margaret M., Matthew C. H. Jukes, and George Okello. "Early Primary Literacy Instruction in Kenya." *Comparative Education Review* 56, no. 1 (2012): 48–68. <https://doi.org/10.1086/660693>.