How to Teach Tool Skills

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There are two kinds of knowledge systems, or subjects: content knowledge (history art, literature, much of science, social studies) and tool skills (such as reading and math).

What are Tool Skills?

In content subjects, such as art (painting, sculpture, music, dance), the skill elements are loosely connected, or somewhat *independent*. We can learn painting without learning music.

Tool skills include reading, spelling, math, language, logic, major parts of STEM curricula, computer sciences, and behavior (such as visually scanning and focusing, talking, writing, and drawing). We use tool skills to learn everything else, like content knowledge. See Haughton, 1972; Johnson & Street, 2004; Koorland, Keel, & Ueberhorst, 1995.

In contrast to content knowledge,

* *Skill elements in tool skills are tightly connected.* They work together. For instance, to do simple addition (3 + 5 = ), you have to know already what a group of items is; how to count items in a group; how to count forward by ones; connect quantities (/, //) with numerals (1, 2); and focus on individual items. And so, *it is best when several elements are taught closely in time in the same lessons.*
* *Learning one skill logically and pretty easily leads to learning the next.* For example, when students learn to count forward by ones, it is pretty easy for them next to count forward by two’s. When students learn to count groups (“One, two, three bunnies….. one… two… three… four… five bunnies), it is pretty easy for them next to see 3 + 5 =, and then to say, “Start with three and count five more… four, five, six, seven, eight. Three plus five equals eight.”
* *Elements are strategically integrated into larger routines* (Kameenui & Simmons,1999). For instance, once students learn the skill elements of counting, estimation, multiplication, subtraction, and writing numerals, they integrate these in the *routine* (steps) of long division.

Therefore, tool skills are best learned by (1) teaching a small number of elements in daily lesson tasks; (2) adding new examples (such as letter-sounds and words to say slowly and fast) over several lessons; and then (3) teaching students to integrate earlier-taught elements into wholes (words and sentences).

These differences in content vs. tool skill knowledge mean that we scaffold curricula differently. Please compare table 2.1 with table 3.1. below.

<Insert table 3.1 near here.>

Table 3.1. Scaffolding Tool Skill Curricula

|  |
| --- |
| Includes reading, writing, spelling, math, logic, language, movements (for instance, visually scanning), and certain topics in the sciences (such as equations).  These are the tools for learning and using content subjects such as history, literature, art,  sciences, and social studies, and for learning other tools skills; for example, using reading to learn math.  .  Scaffolding by sequences.  1. The principle of logical progression. Teach parts (elements) first. r says rrr. a says ahh. M says mmm.  2. The principle of strategic integration (Kameenui & Simmons, 1999). Integrate parts/elements into wholes, such as routines. ram 🡪 rrraaammm 🡪 ram!  See word. Sound it out. Read it fast.  3. Tool skill curricula are organized by *strands* (each skill element is taught for a certain number of lessons), displayed on *scope and sequence charts*. See table 3.2.  4. The knowledge elements of tool skills are so *interdependent* that several are taught in  short Tasks in the *same* lessons, and then are *integrated* into larger wholes in later lessons.  For example, in arithmetic, number-numeral relationships (///, three, 3), writing numerals, counting forward and backwards 🡪 Now integrate these into addition and subtraction 🡪  then multiplication 🡪 then long division routines.  Scaffolding with Features of Student-Teacher Communication  5. Cueing and reinforcing improvement in academic skills and classroom participation (chapter 4).  6. Model-Lead-Test/check-Verification (chapter 5) is a main communication format for explicit, focused instruction, combined with Socratic questioning (chapter 6).  *Model (I do).* “I’ll count to five….”  *Lead (We do).* “Let’s count to five together….”  *Test/check (You do).* “Your turn to count to five…”  *Verification.* “Yes, one, two, three, four, five! You counted to five!”  *Socratic questions.* “When we counted to five, what numeral did we say first?....”  “What numeral did we say last?”... “Can we count to five cookies?”  7. Add-ons to teacher-student communication (instruction), such as think time, highlighting, repetition, reminders, hints, Cornell Notes, Guided Notes, written steps of worked examples, and others increase clarity, engagement, the organization of knowledge, and recall. (chapter 7).  8. Preventing and correcting errors. (chapter 8.) |

Following is an example of teaching tools skills.

Tanya Hill Teaches Beginning Reading

Tanya Hill, at Blue Sky Elementary School, knows the formats (teacher-student communications) for teaching all of the skill elements of reading. For example,

Format for teaching phonological awareness: segmenting words into sounds.

Model (I do). “I’ll show you how to say table ssslloowwwllyyy... taaablllle… Again, taaabllle.”

Lead (We do). “Now you say table sssllloowwwlllyy with me… Get ready…” *taaabllle.* “Yes, we said table slowly.”

Test/check (You do). “Your turn to say table ssllooowwwllly… Get ready”… *taaabllle.*

Verification. “Yes, you said table slowly.”

The scope and sequence chart tells Ms. Hill when to use that format!

<Insert table 3.2 near here.>

Table 3.2. Scope and Sequence Chart for a Tool Skill Curriculum in Kindergarten Reading

Taught and Reviewed During Lessons

1 3 7 25 50

Skill Elements

Attention, calm, focus, take turns with teacher, -------------------------------------------------------

cooperate with signals; for instance, when the

teacher touches under letters, students say the

sounds. (Learning Readiness Skills—chapter 9.)

Say sounds slowly (mmm, ahh) and fast (m! a!) ----------

to prepare to learn letter-sounds and to say words

slowly and fast. (Phonological awareness.)

Say words slowly (segment) and fast (blend). ---------------- -----------

mmmaaa…ma! (Phonological awareness.) one-two syllables three or more

Onset-rhyme. s/it, f/it (Phonological awareness.) -------------------

Letter-sounds. New, and later, review and build ------------------------------------------------------

fluency with lists. (Alphabetic principle.) a m s e…

Decode (slow and fast) one-syllable regular words. ------------------------------------------------------

New, review, generalization, fluency (fast). *This*  ma see

*strand integrates all of the above skill elements.*  sa me

(See chapter 17.)

Read irregular words. said, enough ------- ------- -------

Vocabulary/concepts. Definitions. Read ------------------------------------------------------

fast from lists (chapter 12) Fluency (chapter

4).

Read sentences slowly and fast. *This strand*  --------------------------------------------

*integrates all of the earlier skill elements.*

Read words with parts. pre/par/ing. --------------------------------

Sound out parts, then read fast.

## Read stories. Sound out the sentences and then

read fast. *This strand integrates all earlier* -------------------------------------------

*strands.*

Comprehension ------------------------------------------------------

Literal. “What did the duck say?” Teacher Teacher/ Students

Inferential. “What happened first?” reads students read

“What moral lessons can we learn?” read

“What is the sequence of events?”

“Define courage, loyalty.”

A vertical line though the strands shows what the class learns in Tasks in the Lessons. What is taught in Lesson 3?

Where Did the Scope and Sequence Chart Come From?

The scope and sequence chart came from a *knowledge analysis* of reading. Curriculum developers, including teachers, take a skill such as reading and *break it down into smaller and smaller elements*. Then, they *list the elements in a logical (‘You have to know this before you can do that.”) order*. For instance, here is what must be taught before students can sound out words. sam 🡪 sssaaammm

* Say sounds.
* Say words slowly.
* Say sounds of letters.
* Scan words from left to right. See each letter.
* Say sounds of letters from left to right.

Chapter 16 shows a knowledge analysis of decoding.

Then curriculum developers do *research to find out how many lessons* it takes to learn the skill elements they have identified. These are the horizontal lines on the scope and sequence chart.

Ms. Hill Uses the Scope and Sequence Chart to Design Lessons

Here are her guidelines.

1. Lessons are divided into about 10 Tasks.
2. Tasks teach half a dozen or so skill elements as shown on table 3.2.
3. Each skill element (strand) has its own Tasks from lesson to lesson.
4. Tasks (aside from stories) are no more than a few minutes. The pace is brisk.
5. Ms. Hill works on all *phases of instruction.* (See chapter 4.) When students are pretty firm with examples of a new skill (*acquisition*), Ms. Hill reviews and firms the examples (*maintenance*), teaches students new examples of the same skill (*generalization*), and teaches the class to go faster to build confidence and ease (*fluency-building*). When students are firm on needed skill elements (say sounds, say letter-sounds, say words slowly and fast, scan words from left to right), Ms. Hill *helps them to strategically integrate these into a larger whole—the decoding routine (chapter 16).*

6. Ms. Hill’s uses the communication format *Model (I do)-Lead (We do)-Test/check (You do)-Verification (specific praise) for all all phases of instruction*. (See chapter 5.) Why? Because

* The MLTV format moves quickly and holds attention.
* Its consistent structure (My Turn, Our turn, Your turn) means that students soon learn their and their teacher’s parts, so that students are prepared for what comes next. “Next, she will say, ‘Your turn!’”
* It moves from all-teacher (Model) to all students (Test/check).
* And it clearly shows (during the Lead and Test/check) whether the students are “getting it.” “Maybe I should repeat the model… Maybe I should add a hint.”

7. Ms. Hill increases students’ success by correcting every error (chapter 8) and by using add-ons, such as pointing, hints, questions, repetition (chapter 7)

Table 3.3 shows what Ms. Hill’s tool-skill lessons look like. Note.

* The skills taught in *earlier Lessons* have prepared students for next lessons (logical sequence).
* Earlier Tasks *in lessons* prepare students for skills taught in the *next* Tasks, because earlier skills are *used* in the next; for example, say a sound; then learn the letter-sound.
* As students learn the needed elements, the teacher uses formats in chapter 14 for helping students to integrate these elements into routines.

<Table 3.3 near here.>

Table 3.3. Tasks in Beginning Reading Lessons.

|  |  |  |  |
| --- | --- | --- | --- |
| Lesson 1 | Lessons 2-5 | Lessons 6-10 | Lessons 11- |
| Task 1. Sit tall and calm.  Task 2. Tell what students will learn, and get students interested in the story read at the end of the lesson    Task 3. Practice taking turns with the teacher.  “My turn to say a sound… sssss. Now, your turn to  say that sound.” (*Maintenance of skill*)    Task 4. Practice focusing on teacher’s sound models and pointing.  (*Maintenance of skill*)    Task 5. Say *new* sounds---ah…mmm---that will soon be in words to decode. (*Acquisition of new knowledge*)    Task 6. Say new words slowly and fast (Phonological awareness)—especially words soon to decode. am, me, ma, ram, rat, sam, cat, sit, sits, sat, mat.  The teacher uses the  *Forward chaining: Cumulative* format---  Model-Lead-Test/check-  Verification with all  of the steps (See chapter 14) (*Acquisition*)  Task 7. Teacher reads  a story, asks students questions. | Task 1. Sit tall and calm. Practice taking turns.  Task 2. Tell  what students will learn, and get students interested in the story at the end  of the lesson  Task 3. Review and firm examples of earlier skills. (*Maintenance*)    Task 4. Teach *more* words to say slowly and fast.  (*Acquisition*)  Task 5. Teach  the sounds that go with the letters a and m using Model-  Lead-Test/check-  Verification. (*Acquisition*)  Task 6. Review saying am, me, ma, ram, rat, sam, cat,  sit, sits, sat, and mat  slowly and fast.  Task 7. Teacher  reads a story, defines words, asks students questions. | Task 1. Sit tall and  calm. Practice taking turns.  Task 2. Tell what students will learn, and get students interested  in the story at the end  of the lesson  Task 3. Review and  firm examples of earlier skills. (*Maintenance*)  Task 4. Say new sounds in words to be decoded in Task 6 (*Acquisition*)  Task 5. Over lessons 6-10, teach new letter sounds (one every few days). (*Acquisition*)  Task 6. Over lessons 6-10, teach the *decoding* routine (sound out, then read fast): sam, me,  mat, rat, ram, tam,  meet, sad.  (*Acquisition of the routine* that strategically integrates earlier skill elements). See chapter 14.  Task 7. Teacher and students read a story; teacher defines words; asks questions; students elaborate on the story. | Task 1. Sit tall and calm. Practice taking turns.  Task 2. Tell what students will learn,  and get students interested in the story at the end of the lesson.  Task 3. Review and firm examples of earlier  Skills. (*Maintenance*)  Task 4. New sounds and words to say slowly and fast. (*Acquisition*)  Task 5. Teach new  letter-sounds every 3 or  4 lessons. (*Acquisition*)  Task 6. Teach  students to decode (first sound out and then read  fast) new words made with earlier and new letters. (*Generalization*  *of knowledge to new examples*)  Task 7. Read word lists slowly and fast—a *fluency routine*.  Task 8. Read sentences  (a *routine*). Teach what new words (concepts/names) mean. (*Acquisition*)  Task 9. Read stories—a *routine* with many steps that integrates all skills. |

We’ve seen the big picture (a scope and sequence chart, table 3.2). Then we saw a series of lessons whose skills were selected *from* the scope and sequence chart (table 3.3). Now let’s see what *one* of Ms. Hill’s 5-Part reading Lessons (27) looks like.

Note. The letter-sounds and many words used in the lesson are from a highly effective (because it is well scaffolded) tool skill strand curriculum called *Teach your child to read in 100 easy lessons* (Engelmann, Haddox, and Bruner, 1984). Specifically, the authors used the

1. *Sequence of letter-sounds taught in the first 26 lessons*. m s a e t [I] r d i th c o n f

The authors added the word I.

2. *Sequence of words to decode taught in the first 26 lessons.* The authors added the word I.

a am ma me at met mat set sat see eat [I] ram rat seed the sam seat sad mad meat read ear it sit meet is seem this that cat sack sick rack mom rod sock rock on not in an can man on not in ant fat near fan feet

However, the lesson below was invented by the authors. It is consistent with, but was not taken from, *Teach your child to read in 100 easy lessons.*

Note that Tasks include review and firm (*maintenance* of) earlier knowledge; *acquisition* of new knowledge; *generalization* of earlier knowledge to new examples; *discrimination* of similar examples (fit/fin); *fluency-building*; *integrating skill elements into routines* (decoding words, reading sentences), *error correction*; *add-ons*; and the *Model (I do), Lead (We do), Test/check (You do), Verification teaching format*. These are topics in chapters 4-8.

Student speech is in italics.

Task 1. Overview and Stimulate Interest

a. “Boys and girls. Let’s get ready to learn. Hands and feet calm. Eyes looking at me… Great! We are ready!”

b. “Boys and girls, let’s talk about our story from yesterday. Let’s make a list of who was in it and what happened.”…

c. “We have a new story today. There are new characters in our story. There’s a cat, a rat, a hat, a sack, a sock, and an ant. I wonder what will happen.”

“Do any of you have a pet cat?... I have a pet ant. Ha Ha. His name is Bob. Bob has a cool cap.” [Show pictures of these to increase interest.]

[Now that students are interested in the new story, they are ready to review earlier knowledge needed to read the new story.]

Task 2. Practice relevant prior knowledge.

a. “Let’s review some of our letter-sounds. [*Maintenance*] When I touch under a letter, you say the sound.” …. I d th c n f

[Correct any errors. “That letter says the sound ffff. What sound?... *fff…* Yes, fff.”]

b. “Let’s review some of our words from yesterday’s story.” [*Maintenance*]

“When I touch next to a word, you sound it out. Then I’ll say, ‘Read it fast!’ Get ready!”

rack rod sock rock not in can man

[Correct any errors. A student reads rod as rrroood. “That word is rrraaahhhd. Sound

it out with me… *rrraahhhd….* Your turn. Sound it out… *rrraahhhd…* Yes, rrraahhhd.”]

c. “Now let’s make some new words out of our old ones. Just sound them out the way we do. Then I’ll say, ‘Read it fast!’” [*Generalization*. Notice how letter-sounds are strategically integrated to form new words.] sand rear dot meets dock on tan ants

[Correct any errors with Model-Test/check.]

d. “Now let’s read old and new words fast. [*Fluency*] When I touch next to a word, you sound it out. Then I’ll say, ‘Read it fast!’” rack rod sock can sand rear dot on tan ants

[Correct any errors with Model-Lead-Test/check. For instance, “Listen. I’ll read these words fast….. Now you read these words fast *with* me….. Your turn, read these words fast…. Yes, you read these words fast!”]

[Scaffold reading faster by adding pacing (for instance, clap to start each word), and by setting a goal.]

“Let’s read all our words in one minute and with only three mistakes! A fast reader star for everyone!”

“First word (pause) Read it fast.” (clap) …. *rod …* “Yes, rod!”

“Next word (pause) Read it fast.” (clap)… *sock …* “Yes, sock!”

[Now this skill is firm, and students are confident that they can read old and new words. So, they are ready to learn new words (in Task 3) needed for the story.]

Task 3. Pre-teach new knowledge needed for Task 4.

a. New letter-sound. [*Acquisition*]

“Boys and girls (Gain attention). New letter-sound (Frame the task). Follow my finger.” [Added scaffold, an instruction.]

“When I touch under the letter [scaffold--preparation] I will say the sound. Here I go. [u] uhh.” [*Model. I do*]

“Again, uhh.”

“Now when I touch under the letter, you say the sound *with* me. [*Lead. We do*.] Get ready.” [Scaffold]

*uhhh.*

“Yes, uhhh.” [*Verification.]*

“Now when I touch under the letter, you say the sound all by yourself.” [Test-check.

You do.]

“Get ready.” [Scaffold--preparation]

*uhhh*

“Yes, uhhh. I walk uuuhhp the stairs.” [Verification.]

b. New words for the story.

[Using letter-sounds that students learned earlier, and the new one (u 🡪uhh) just taught, the students learn to decode new words that are in the story.]

fun run sits fast sees team

“Boys and girls. Follow my finger. [Points to words on the board.] Here are new words in our story. Let’s sound them out and then read them fast.”...

Task 4. Main part of lesson. New story.

[Students sound out each sentence word by word with the teacher, and then read each sentence fast by themselves. There are also comprehension (Socratic) questions and discussion.]

Task 5. Inquiry.

[Students add their own ideas to the story—maybe more characters and events—and

read to the class.]

Later chapters show many examples of teaching reading, math, and science tool skills.

Helpful Resources on Tool Skills

1. Programs and strand curricula.

Engelmann, 2008; Engelman & Osborn, 2002, 2008; Engelmann, Haddox, & Bruner, 1984; Engelmann, Carnine, & Johnson, 1978; Engelmann, 1996; Foorman, Beyler, Borradaile, Coyne, Denton, Dimino, J., … & Wissel, 2016; Przychodzin, Marchand-Martella, Martella, R. & Azim, 2004). Snider, 2004; Stein, Kinder, Silbert, & Carnine, 2005l and www.nidi.org.

2. Scope and sequence charts.

<https://www.time4learning.com/scope-sequence/>

<https://justaddstudents.com/scope-and-sequence-how-to-easily-create-your-own/>

<https://aphbop.org/files/BOP_1stGrade_Scope_SequenceChart_protected.pdf>

<https://amplify.com/pilotpacks/ckla-scope-and-sequence/>

<https://elementarynest.com/understanding-the-importance-of-a-scope-and-sequence/>

<https://www.weteachnyc.org/media2016/filer_public/c4/c7/c4c7bb95-6f4a-40eb-abea-7217c5c34249/science_scope_and_sequence_2022_v2_web.pdf>

<https://literacy.amplify.com/wp-content/uploads/sites/3/2021/01/CKLA_GK_Knowledge_Scope_and_Sequence.pdf>

<https://www.weteachnyc.org/media2016/filer_public/9f/9d/9f9d01fe-7199-4c53-8e3e-253301901ce5/science_scope_and_sequence_912.pdf>

<https://i.pinimg.com/originals/a1/2b/03/a12b03479262e5217795fe424641f438.png>

<https://studylib.net/doc/6713597/number-scope-and-sequence-guide--draft->

Okay, that’s it for scaffolding content knowledge (chapter 2) and scaffolding tool skills. In the next chapter we learn tools for helping students to improve classroom participation and achievement.

References

Abd-El-Khalick, F., Lederman, N., & Schwartz, R. (2015). Inquiry, as a curriculum strand. *Encyclopedia of science education*, 510, 514.

Archer, A. L., & Hughes, C. A. (2010). *Explicit instruction: Effective and efficient teaching*. Guilford Publications.

Binder, C. (1988). Precision teaching: Measuring and attaining exemplary academic achievement. *Youth Policy,* *10*(7), 12–15.

Binder, C. (1996). Behavioral fluency: Evolution of a new paradigm. *The Behavior Analyst,* *19*, 163–197.

Binder, C., & Haughton, E. (2002). Using learning channels and the learning channel matrix. Paper presented at the International Precision Teaching Conference, Harrisburg, PA

Binder, C., & Watkins, C. L. (1990). Precision teaching and direct instruction: Measurably superior technology in schools. *Performance Improvement Quarterly, 3*(4), 74–96.

Carnine, D., Silbert, J., Kameenui, E. J., & Tarver, S. G. (1997). *Direct instruction reading*. Merrill.

Cooper, J. O., Heron, T. E., & Heward. W.L (2020). *Applied behavior analysis*. Pearson UK.

Crawford, D. B., & Snider, V. E. (2000). Effective mathematics instruction the importance of curriculum. *Education and Treatment of Children*, 122-142.

Engelmann, O. (1996). *Connecting math concepts lesson sampler.* Chicago: Science Research Associates.

Engelmann, S. (2008). *Reading mastery signature edition [Curriculum program]*. McGraw-Hill Education.

Engelman, S., & Osborn, J. (2002). *Language for thinking*. SRA/McGrawHill.

Engelman, S., & Osborn, J. (2008). *Language for learning.* SRA/McGrawHill.

Engelmann, S., Haddox, P., & Bruner, E. (1984). *Teach your child to read in 100 easy lessons*. Simon and Schuster.

Engelmann, S., Carnine, L., & Johnson, G. (1978). *Corrective reading*. Science Research Associates.

Evans, A. L., Bulla, A. J., & Kieta, A. R. (2021). The precision teaching system: A synthesized definition, concept analysis, and process. *Behavior Analysis in Practice,* *14*, 559–576.

Frampton, S. E., Munk, G. T., Shillingsburg, L. A., & Shillingsburg, M. A. (2021). A systematic review and quality appraisal of applications of direct instruction with children with Autism Spectrum Disorder. *Perspectives on Behavior Science*, *44*, 245-266.

Foorman, B., Beyler, N., Borradaile, K., Coyne, M., Denton,C. A., Dimino, J., … & Wissel, S. (2016). *Foundational Skills to Support Reading for Understanding in Kindergarten through 3rd Grade. Educator's Practice Guide. NCEE 2016-4008.* What Works Clearinghouse.

Frayer, D., Frederick, W. C., & Klausmeier, H. J. (1969). A schema for testing the level of cognitive mastery.Wisconsin Center for Education Research.

Gist, C., & Bulla, A. J. (2022). A systematic review of frequency building and precision teaching with school-aged children." *Journal of Behavioral Education* *31*(1), 43-68.

Griffin, C. P., & Murtagh, L. (2015) Increasing the sight vocabulary and reading fluency of children requiring reading support: The use of a precision teaching approach. *Educational Psychology in Practice* 31(2), 186-209.

Haring, N. G., White, M. S., & Neely, M. D. (2019). *Precision teaching—A practical science of education*. Sloan Publishing.

Haughton, E. C. (1972). Aims—Growing and sharing. In J. B. Jordan & L. S. Robbins (Eds.), *Let’s try doing something else kind of thing* (pp. 20–39). Council for Exceptional Children.

Haydon, T., Mancil, G. R., Kroeger, S. D., McLeskey, J., & Lin, W. Y. J. (2011). A review of the effectiveness of Guided Notes for students who struggle learning academic content. *Preventing School Failure: Alternative Education for Children and Youth*, *55*(4), 226-231.

Hofmeister, A. M., Engelmann, S., & Carnine, D. (1989). Developing and validating science education videodiscs. *Journal of Research in Science Teaching*, *26*(8), 665-677.

Jefferson, T. (1776). *Declaration of independence*. https://www.archives.gov/founding-docs/declaration-transcript

Johnson, K. R. & Layng, T. V. J. (1994). The Morningside Model of generative instruction. In R. Gardner III, D. M., Sainato, J. O., Cooper, T. E., Heron, W. L., Heward, J., Eshleman, & Grossi, T. A. (Eds.), *Behavior analysis in education: Focus on measurably superior instruction* (pp. 173–197).

Gist, C., & Bulla, A. J. (2022). A systematic review of frequency building and precision teaching with school-aged children. *Journal of Behavioral Education*, *31*(1), 43-68.

Johnson, K. & Street, E.M. (2004). *The Morningside Model of Generative Instruction: What It Means to Leave No Child Behind*(1st ed.). Cambridge Center for Behavioral Studies.

Johnson, K. R., & Layng, T. V. J. (1996). On terms and procedures: Fluency. *The Behavior Analyst, 19*, 281–288.

Johnson, K. R., & Layng, T. V. J. (1992). Breaking the structuralist barrier: Literacy and numeracy with fluency. *American Psychologist,* *47*, 1475–1490.

Kame'enui, E. J., & Simmons, D. C. (1999). *Toward Successful Inclusion of Students with Disabilities: The Architecture of Instruction. Volume 1: An Overview of Materials Adaptations. ERIC/OSEP Mini-Library*. Council for Exceptional Children.

Koorland, M. A., Keel, M. C., & Ueberhorst, P. (1995). Setting aims for precision learning. *Journal of Precision Teaching, 2*, 56-60.

Kubina, Richard M. (2019). *The precision teaching implementation manual*. Greatness Achieved Publishing Company.

Kubina, Richard M., and Kirsten KL Yurich. (2012). *Precision teaching book*. Greatness Achieved Publishing Company.

Kunzelmann, H. (1970). *Precision Teaching: An Initial Training Sequence.* Special Child Publications.

Lambe, D., Murphy, C., & Kelly, M.E. (2015). The impact of a precision teaching intervention on the reading fluency of typically developing children. *Behavioral interventions* *30*(4), 364-377.

Lindsley, O. R. (1992). Precision teaching: Discoveries and effects. *Journal of Applied Behavior Analysis,* *25*, 51–57.

Maloney, M. (1998). *Teach your children well: A solution to some of North America’s educational problems*. Cambridge Center for Behavioral Studies.

Marchand-Martella, N.E., Slocum, T.A., & Martella, R.C. (2003). *Introduction to Direct Instruction.* Pearson.

McLaren, B. M., & Isotani, S. (2011). When is it best to learn with all worked examples?. In *Artificial Intelligence in Education: 15th International Conference, AIED 2011, Auckland, New Zealand, June 28–July 2011 15* (pp. 222-229). Springer Berlin Heidelberg.

Pauk, W., & Owens, R. J. (1993). *How to study in college*. Boston, MA: Houghton Mifflin.

Przychodzin, A. M., Marchand-Martella, N. E., Martella, R. C., & Azim, D. (2004). Direct Instruction Mathematics Programs: An Overview and Research Summary. *Journal of Direct Instruction*, *4*(1), 53-84.

Snider, V. (2004). A comparison of spiral vs. strand curriculum. *Journal of Direct Instruction, 4*(1), 29-39.

Stein, M., Kinder, D., Silbert, J., & Carnine, D. W. (2005). *Designing effective mathematics instruction: A direct instruction approach*. Pearson.

Stocker, Jr. J. D., Kubina, R. M., Crumpler, E. R., Kozloff, M., & Swanton-Derushia, E. (2023). Effects of an explicit decoding plus frequency building intervention on word reading fluency for students with disabilities in an urban elementary setting. *Learning Disability Quarterly*, *46*(4), 276-291.

Stocker, Jr J.D., Schwartz R., Kubina, Jr R.M., Kostewicz D., & Kozloff M. (2019). Behavioral

fluency and mathematics intervention research: A review of the last 20 years. *Behavioral Interventions*, *34*, 102-117

Tiernan, A. M., McCoy, A., Mendonca, J., Lydon, H., & Diffley, S. (2022). The implementation of Precision Teaching for the improvement of academic skills: A systematic review of the literature over thirty years. *Behavioral Interventions*, *37*(2), 505-528.

White, O. R. (1986). Precision teaching-precision learning. *Exceptional Children,* *52*(6), 522–534.