Suggestions for Instructional Materials

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These are suggestions to improve core and supplemental instructional materials, for all school subjects, used in U.S. schools from kindergarten to twelfth grade. [1]

1. Instructional materials should be open educational resources (OER) that anyone can access and use free, at least for noncommercial purposes (for example, CC-BY-NC-SA or Creative Commons Attribution-NonCommercial-ShareAlike). There should be a GitHub or GitLab repository containing the source code of the materials. [2]

2. Instructional materials should:

    - Devote most time to instruction that is interactive (teacher and students take turns), where the teacher explains and models concepts and procedures in small steps before getting students to apply those concepts and procedures. [3]

[1] Additional suggestions to improve education, which instructional materials could choose to address, are as follows:(1) Encouraging caregivers to keep mobile phones and social media away from their children.(2) A playlist of made-for-kids videos relating to topics in the Core Knowledge Foundation's ***Core Knowledge Sequence*** (especially videos that invite viewers to answer questions on the topics they present), for each grade from kindergarten to eighth grade, intended for children to optionally watch at home outside instruction.(3) Teacher training in every school subject should cover the following topics as much as possible: (A) Cognitive load theory, working memory (and how severely limited it is), long-term memory, and effective study practices (for example, retrieval practice, cover/copy/compare, spaced repetition, interleaving); (B) the importance of devoting most time to interactive, turn-taking instruction where the teacher explains and models concepts and procedures in small steps before getting students to apply those concepts and procedures (examples: **Barak Rosenshine's principles** or Engelmann's **Direct Instruction**) and of **not giving hands-on/"inquiry"/discovery activities** until students have mastered the necessary background knowledge and skills;(C) the importance of eliminating distractions to learning such as **classroom noise**, **classroom overdecoration**, and **mobile phones during school days**;(D) the importance of having a **knowledge-rich curriculum** (see suggestion 3 in the body of this page) and of teaching and using academic vocabulary (for example, Coxhead's **Academic Word List**); (E) modeling good student behavior and setting consequences for misbehavior; (F) practical ways to implement topics A to E, earlier in this list, in teachers' day-to-day work, along with instructional coaching and rehearsal; (G) research references on topics A to F. https://www.coreknowledge.org/core-knowledge-sequence/ https://www.aft.org/sites/default/files/Rosenshine.pdf https://www.zigsite.com/trainingvideos/PDFs/rubric.pdf https://www.tandfonline.com/doi/abs/10.1207/s15326985ep4102_1 https://www.nathanielswain.com/cognitoriumblog/2024/6/quiet-and-silence https://teachthinkblog.wordpress.com/2021/04/06/minimising-classroom-displays/ https://www.educationnext.org/take-away-their-cellphones-rewire-schools-belonging-achievement/ https://link.springer.com/book/10.1007/978-3-031-74661-1 https://www.wgtn.ac.nz/lals/resources/academicwordlist

[2] This suggestion may make it easier for the general public to view, edit, give feedback on, and suggest changes to the instructional materials for various reasons, including: To reduce cognitive load on students and teachers (without reducing rigor); to improve historical accuracy; to correct errors; to best take advantage of research on how humans learn (such as retrieval practice and interleaving of topics); to keep the materials up to date with scientific, technological, and historical scholarship; and to reduce preparation time for teachers.

[3] Greg Ashman's definition of explicit instruction; Groshell's *Just Tell Them* (see **book club materials**). Similar instructional advice is also found in **Barak Rosenshine's principles of instruction** (Amer. Educator, spring 2012) and *Direct Instruction: A Practitioner's Handbook* (Kurt Engelmann). **Direct Instruction** lessons typically involve frequent rounds of teachers' asking questions and students' answering them in unison, with many rounds being repeated "until firm". *Teach FAST* (Tavernetti) suggests a **framework for lesson planning** that instructional materials can adopt. https://educationrickshaw.com/2025/04/04/book-club-materials-for-just-tell-them/ https://www.aft.org/sites/default/files/Rosenshine.pdf https://www.nifdi.org/research/journal-of-di/volume-3-no-2-summer-2003/449-the-components-of-direct-instruction.html https://educationrickshaw.com/2025/09/06/the-truth-about-lesson-planning/

- Give review questions in class, with low or no stakes, at least once a week using the theory of spaced and interleaved retrieval practice (for example, a quiz of randomly arranged questions from **last lesson, last week, last unit, and course-so-far**[4], or **Leitner's flashcard review system**[5]).
- **Get every student participating**[6] in the lessons as frequently as possible, such as by answering in unison either orally or with mini-whiteboards, by "turn-and-talk" for open-ended questions, and by calling on students at random.
- Encourage teachers to get every student attending to the lessons, such as by assigning to each student a seat that faces the teacher; reducing noise and classroom decoration; and banning mobile phone use.
- Require as little preparation time as possible.
- Avoid unnecessary tasks, especially cutting and gluing.
- Avoid unnecessary, distracting, or merely decorative pictures or illustrations.

3. Instructional materials should be **knowledge-rich**[7]. In Language Arts, they should also follow the criteria given in the **Knowledge Matters Campaign's review tool**[8].

4. There is guidance for [9]:

    - **Content**[10] that could form part of a knowledge-rich curriculum up to eighth grade, and content for **Mathematics**[11], **Science**[12], and **Social Studies**[13] instruction up to twelfth grade.
    - Offering numerous **options to do beyond-grade-level content and exercises**[14] for willing and ready students, as long as these options are always presented to all students [15].
    - **Math-fact and other mental-math fluency**[16] (accuracy and rate) goals, in digits correct per minute.
    - **Instructional practices**[17] and **course content**[18] for Mathematics; also see **Merlo 2024**[19].
    - Structuring lessons in History and other aspects of Social Studies using the **Four-Question Method**[20].
    - Structuring lessons in U.S. Civics using the questions in the civics portion of the naturalization test given by the U.S. government, or using such questions for retrieval practice.
    - Devoting a nontrivial amount of daily instructional time to **Social Studies**[21] and **Science**[22]

[4] https://x.com/SuzanneRelou/status/1878428245252558888

[5] https://solinthewild.substack.com/p/why-spacing-beats-cramming-the-simple

[6] https://achemicalorthodoxy.co.uk/2020/02/09/ratio/

[7] https://link.springer.com/book/10.1007/978-3-031-74661-1

[8] https://knowledgematterscampaign.org/review-tool/

[9] This document notes that "culturally responsive pedagogy", while valuable, **has no rigorous evidence** of its improving student achievement by itself. See, for example, the **cultural responsiveness scorecard** or initiatives to increase rigor and quality of **Latino American content** and **black American content**. https://scienceoflearning.substack.com/p/teaching-for-more-equitable-outcomes https://steinhardt.nyu.edu/sites/default/files/2020-12/CRE%20Scorecard%20Revised%20Aug%202020.pdf https://unidosus.org/publications/analyzing-inclusion-of-latino-contributions-in-us-history-curricula-for-high-school/ https://hub.jhu.edu/2021/02/10/black-history-curricula-lacking-rigor-and-quality/

[10] https://www.coreknowledge.org/core-knowledge-sequence/

[11] https://www.nas.org/reports/the-archimedes-standards/full-report

[12] https://www.nas.org/reports/the-franklin-standards/full-report

[13] https://civicsalliance.org/american-birthright/

[14] https://slatestarcodex.com/2018/09/04/acc-entry-does-the-education-system-adequately-serve-advanced-students/

[15] One example, similar to the approach found in *Illustrative Mathematics*, is the presence in student workbooks of "Are you ready for more?" followed by a challenging exercise. Another example is a relatively short unit on basic calculus concepts such as limits and continuous functions at the end of Algebra 2, such as the last unit of **Fishtank Learning's Algebra 2 course**. https://www.fishtanklearning.org/curriculum/math/algebra-2/

[16] https://factsonfire.com/

[17] https://www.thescienceofmath.com/

[18] https://mathacademy.com/courses

[19] https://www.cis.org.au/publication/the-science-of-mathematics-and-how-to-apply-it/

[20] https://4qmteaching.net/

[21] https://ccsso.org/sites/default/files/2018-11/Elementary%20SS%20Brief%2045%20Minute%20Version_0.pdf

[22] https://www.nsta.org/nstas-official-positions/elementary-school-science

instruction up to fifth grade.

5. Instructional materials in Language Arts:

   - Should teach synonyms for new words to be learned and for other words and phrases prone to overuse.
   - In sixth grade and up, should include copious lessons on grammatical analysis and knowledge of English syntax, as well as concrete guidance to help students avoid, in their writing, overused or imprecise words and phrases, both within and across writings [23]; redundant or unnecessary language not serving an expressive purpose; and ambiguous language.
   - Should feature, as works that the whole class reads aloud in their entirety during instruction, **prose novels**[24] with high literary and lexical complexity for the grade level (such as the complexity seen in the Harry Potter series) and knowledge-building informational prose books with the same complexity.
   - Should allow teachers to set aside time (say, 5 to 10 minutes) for **oral reading fluency**[25] practice (such as repeated reading, partner reading, and choral reading), especially if some of their students read below the normal level of words correct per minute for the grade level.

Suggestion number 5, in particular, is intended to address observations that our language may be getting poorer by the year, in terms of everyday vocabulary and linguistic variety (see, for example, Emilio Bernal's "Good usage prevents abusage"). [26]

1 Open-Source Instructional Resources

More concretely, and without loss of generality, the following open-source resources (for each grade from kindergarten through twelfth grade) should be developed and published for anyone to access and use free. (The resources should follow suggestions 1, 2, 3, and 5 given earlier.)

1. A fine-grained scope and sequence that associates mathematics, science, social studies, and English grammar/vocabulary/orthography topics with lessons. The scope and sequence may go beyond twelfth grade and should be in the form of "tracks", as in ***Connecting Math Concepts***[27] and other **Direct Instruction programs**[28], or follow the guidance for "knowledge graphs" in the draft book ***The Math Academy Way***[29]. (**Math Academy**[30] uses a knowledge graph for math — even up to calculus, statistics, etc. — but unfortunately it's unavailable to the public and making a similar graph might be problematic.)Examples of fine-grained topics: "Add two-digit numbers without carries using the standard algorithm", "Add and subtract polynomials", "Learn when to use commas around relative clauses".
2. Daily lesson plans structured per the scope and sequence just described, **following the FAST framework**[31] in Gene Tavernetti's *Teach FAST: Focused Adaptable Structured Teaching.*
3. Language Arts units centered on full-text prose novels and plays in the public domain (out of copyright) along with full-text works on neighboring topics, following the framework in Doug Lemov's *Reading Reconsidered* and *The Teach Like a Champion Guide to the Science of Reading.*

[23] A list of some of the **overused and discouraged words** is given elsewhere. The works of Emilio Bernal Labrada, Theodore Bernstein, Mario Pei, Bill Bryson, and Richard Lederer, among others, provide guidance on good English usage.

[24] https://www.educationnext.org/why-are-books-disappearing-from-english-and-reading-classrooms/

[25] https://medium.com/inspired-ideas-prek-12/what-is-reading-fluency-and-how-should-it-be-assessed-8aaa699c9936

[26] A list of some of the **overused and discouraged words** is given elsewhere. The works of Emilio Bernal Labrada, Theodore Bernstein, Mario Pei, Bill Bryson, and Richard Lederer, among others, provide guidance on good English usage.

[27] https://www.mheducation.com/prek-12/program/connecting-math-concepts-comprehensive-edition-2012/MKTSP-UUF07M0.html#resources

[28] https://www.zigsite.com/trainingvideos/PDFs/rubric.pdf

[29] https://www.justinmath.com/files/the-math-academy-way

[30] https://mathacademy.com

[31] https://educationrickshaw.com/2025/09/06/the-truth-about-lesson-planning/

4. Instructional materials for teaching and reviewing English foundational reading and writing skills (such as academic vocabulary, orthography, morphology, sentence structure, syntax, handwriting, and oral reading fluency) efficiently, in no more than 30 minutes per day, at least to the extent the units mentioned in (3) do not already incorporate such instruction.[32]
5. An English grammar reference book designed for middle school and secondary students.
6. The following parent guides that employ Siegfried Engelmann's Direct Instruction approach: (1) A step-by-step manual for parents to teach reading foundational skills in English to their children, similar to ***Teach Your Child to Read in 100 Easy Lessons***[33]; (2) A guide for building a child's **fluency and automaticity**[34] in mental math (including math facts) at home, including retrieval practice; (3) A guide for building a child's knowledge in essential U.S. civics facts at home, including retrieval practice.

2 License

3 Endnotes

[32] An example for kindergarten to second grade is *UFLI Foundations*; however, the manual for that program is not open source even though it's affordable.

[33] https://startreading.com

[34] https://chalkandtalkpodcast.podbean.com/e/how-to-build-automaticity-with-math-facts-a-practical-guide/

[35] https://creativecommons.org/publicdomain/zero/1.0/