Massachusetts CURATE Project: *Cu*rriculum *Ra*tings by *Te*achers

 Mathematics Rubric, K-12

Purpose of the Rubric

The CURATE rubric is designed for use by CURATE panelists to evaluate core ***curricular materials*** for English Language Arts/Literacy; Mathematics; Science and Technology/Engineering; and Digital Literacy and Computer Science and may also be used by educators in other contexts.

***Core curricular materials*** are comprehensive resources designed for use with *all* students to access grade level content and standards in a given class over the course of a year or semester.

Through the use of the rubric, CURATE aims to elevate curricular materials that are high quality. A further distinction to clarify is connected to skillful implementation and aligned professional learning. The CURATE rubric evaluates for the content of the materials but **does not and is not intended** to measure implementation or professional learning. The Massachusetts Department of Elementary and Secondary Education (DESE) believes ***high quality instructional materials (HQIM)***are aligned to the Massachusetts content and practice standards, empower culturally and linguistically sustaining practices, and exhibit a coherent sequence of target skills, instructional practices, and understandings. These materials are accessible for all students, including students with disabilities, students working above and below grade level, English learners (ELs), and students of color. HQIM should strongly support teachers in their everyday work to be inclusive and culturally and linguistically sustaining.Curricular programs that receive an overall rating of ***“meets expectations”***or ***“partially meets expectations”*** via CURATE are considered HQIM. Although materials may be rated “high quality” this does not mean they are perfect. Materials rely on the skillful implementation of teachers who need to consider their local contexts and student needs. Schools or districts should also consider their local priorities and their student and teacher needs when analyzing CURATE reports since the challenges reported may impact districts differently.

Guidelines for Review

* Review and document all evidence before deciding on ratings.
* Consider quantity as well as quality of evidence for each indicator.
* Consider evidence of high quality as well as evidence of low quality.
* Do not feel compelled to weigh each indicator and criterion equally.
* Do not consider provided examples to be exhaustive or restrictive.
* If evidence is lacking for an indicator, flag it for further data collection.

Sources of Evidence

* The product itself: unit and lesson plans, teacher guides, student-facing resources, associated software, and other components
* Other credible and comprehensive reviews of materials, such as those by [EdReports](https://edreports.org/),
* Perceptual data, such as survey responses and focus group findings, from educators with experience using the product in schools
* Information—such as product specifications and videos of teachers using the product—provided by its developers or publishers
* Research findings: see criterion 5 below for guidance on how to evaluate and interpret research on a product’s efficacy

Definitions of Ratings

* **3: Meets Expectations** – Most or all evidence indicates high quality; little to none indicates low quality. Materials may not be perfect, but Massachusetts teachers and students would be well served and strongly supported by them.
* **2: Partially Meets Expectations** – Some evidence indicates high quality, while some indicates low quality. Teachers in Massachusetts would benefit from having these materials but need to supplement or adapt them substantively to serve their students well.
* **1: Does Not Meet Expectations** – Little to no evidence indicates high quality; most or all evidence indicates low quality. Materials would not substantively help Massachusetts teachers and students meet the state’s expectations for teaching and learning.
* **?: Insufficient Evidence** – More evidence is needed before a rating can be justified. If you are unsure about a rating because you lack relevant information, be sure to choose this option instead of “defaulting” to a rating of Partially Meets Expectations.

Rubric Structure

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| ***Domains*** | Standards Alignment | Classroom Application |
| ***Criteria*** | Content Standards & Organization | Grade-Appropriate Practices | Accessibility for Students | Usability for Teachers | Impact on Learning |

Rubric

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| **Domain: Standards Alignment** |
| **Criterion** | **Indicator** | **Notes and Tips** | **Further Reading** |
| **1. Content Standards and Organization***Note:* This rubric was developed for CURATE, which evaluates materials that have previously been reviewed for alignment to college- and career-ready standards. If using this rubric to review materials not already screened for some degree of standards alignment, consider adding or expanding indicators to ensure a comprehensive evaluation. | 1. **Content progresses coherently from unit to unit and grade to grade in alignment with Massachusetts standards.**
 | * Focus on a comprehensive review of alignment to the MA standards. Note that EdReports does not review for alignment to MA specific standards.
* Review for coherence of content and language expectations from one grade to another and from unit to unit.
* For Grades 9–12, be aware that some products are developed primarily for the Traditional or Integrated course pathway, then reorganized to suit the other pathway in ways that do not always preserve coherence.
 | * [Standards Navigator](http://www.doe.mass.edu/frameworks/search/default.aspx): standards, related resources, and maps of connections between standards
* [Aligning Curriculum to Massachusetts Standards](http://www.doe.mass.edu/instruction/impd/qrg-aligning-curriculum.pdf) and [Math Revision Highlights](http://www.doe.mass.edu/frameworks/math/2017-06revisionhighlights.docx) (differences between Massachusetts and Common Core State Standards)
* Curriculum framework: progression of PK–8 domains (p. [20](http://www.doe.mass.edu/frameworks/math/2017-06.pdf#page=23)), distribution of Conceptual Category standards across high school model courses (Appendix III, pp. [180–190](http://www.doe.mass.edu/frameworks/math/2017-06.pdf#page=183))
* Quick reference guide: [Making Decisions about Secondary Course Sequences](http://www.doe.mass.edu/frameworks/math/2017-06qrg-course-sequences.pdf)
 |
| 1. **Materials build conceptual understanding, procedural fluency, and real-world application in balanced and effective ways.**
 | To meet expectations, materials must:* Balance conceptual understanding, procedural fluency, and real-world application across lessons and units.
* Intentionally sequence conceptual understanding using visual models and/or concrete examples at all grade levels.
* Develop *procedural fluency* by focusing on the act of constructing quantitative relationships rather than memorizing. Procedural fluency directly connects conceptual models and real-world applications.

Engage with *real-world applications* that* Approximate scenarios students may encounter in their everyday lives or future careers, or help them to understand their lives in age-appropriate ways,
* Include real-world data that reveal systemic inequities, allow students to examine their perspectives and others’, and help them advance their thinking and actions about equity, power, and anti-racism.
* Actively draw upon students’ diverse backgrounds, including students generating their own examples to help them deepen learning and make real-life connections.

All students should engage with meaningful, culturally, linguistically, and historically relevant, real-world problems in school every day, and math curriculum should contribute substantively to such engagement. | * [Neighborhood Health Ratios](https://docs.google.com/document/d/1p2RoSDrw3F3aV8ijGuRuYi4K6ylILwPKwy0gWe_x7ck/edit?usp=sharing) (DESE STEM Ambassadors, 2019)
* [The Culturally Responsive-Sustaining STEAM Curriculum Scorecard](https://steinhardt.nyu.edu/sites/default/files/2021-02/CRSE-STEAMScorecard_FIN_optimized%20%281%29.pdf) (New York: Metropolitan Center for Research on Equity and the Transformation of Schools, NYU, 2021)
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| **2. Grade-Appropriate Practices** | 1. **Materials encourage students to use multiple representations when solving problems.**
 | * *Multiple representations* might take visual, physical, symbolic, contextual, or linguistically inclusive verbal forms and include tables, graphs, drawings, diagrams, or models.
* To meet expectations, materials must provide opportunities for students to intentionally move among multiple representations and discover and explain how they connect to one another.
* This indicator relates most directly to SMPs 1, 2, and 4 but connects to other practices as well.
 | Curriculum framework, Appendix II: standards for mathematical practice (SMPs) in * + PK–5 (pp. [171–173](http://www.doe.mass.edu/frameworks/math/2017-06.pdf#page=174))
	+ 6–8 (pp. [174–176](http://www.doe.mass.edu/frameworks/math/2017-06.pdf#page=177))
	+ 9–12 (pp. [177–179](http://www.doe.mass.edu/frameworks/math/2017-06.pdf#page=180))
* [Principles for the Design of Mathematics Curricula: Promoting Language and Content Development](https://ul.stanford.edu/sites/default/files/resource/2021-11/Principles%20for%20the%20Design%20of%20Mathematics%20Curricula_1.pdf) (Stanford University)
* [Math Guidelines: Area of Focus I; Interdependence of Mathematical Content, Practices, and Language](https://assets-global.website-files.com/5b43fc97fcf4773f14ee92f3/5e73a972f52c4e4007662b52_ELSF%20Math%20Guidelines.pdf) (The English Learner Success Forum, ELSF, p.10)
* Quick reference guides: SMPs in
	+ [PK–2](http://www.doe.mass.edu/frameworks/math/2017-06qrg-smp-pk-2.pdf)
	+ [3–5](http://www.doe.mass.edu/frameworks/math/2017-06qrg-smp-3-5.pdf)
	+ [6–8](http://www.doe.mass.edu/frameworks/math/2017-06qrg-smp-6-8.pdf)
	+ [9–12](http://www.doe.mass.edu/frameworks/math/2017-06qrg-smp-hs.pdf)
* ELA/literacy curriculum framework:
	+ PK–5 standards for ELA and literacy in the content areas (pp. [20–73](http://www.doe.mass.edu/frameworks/ela/2017-06.pdf#page=23))
	+ Guidance on literacy and mathematics in PK–5 (pp. [76–78](http://www.doe.mass.edu/frameworks/ela/2017-06.pdf#page=79))
	+ 6–12 standards for literacy in the content areas (pp. [130–150](http://www.doe.mass.edu/frameworks/ela/2017-06.pdf#page=133))
* Guidance on literacy in the content areas in 6–12 (pp. [151–153](http://www.doe.mass.edu/frameworks/ela/2017-06.pdf#page=154))
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| 1. **Materials encourage students to justify solutions to problems using clear oral and written communication.**
 | * This indicator relates most directly to SMPs 3 and 6 but connects to other practices as well.
	+ Do materials incorporate a comprehensive approach to fostering language proficiency in the four domains (speaking, reading, listening, and writing) among Els during student academic discourse?
 |
| 1. **Materials encourage students to solve problems through strategic selection and use of a range of appropriate tools.**
 | * To meet expectations, materials must provide opportunities for students to choose the tools they use, not only to use tools chosen for them.
* This indicator relates most directly to SMP 5 but connects to other practices as well.
 |
| 1. **Materials encourage students to explain their thinking to others and evaluate others’ thinking.**
 | * Materials provide guidance to students on how to engage in Math discourse, how to offer and respond to critical feedback, and how to resolve disagreements about the content.
* Materials provide resources to affirm various cultural, historic, and linguistic representations of math content knowledge. For example, this could include evaluating the reasoning of characters in fictional scenarios; indicator 2e focuses on communication with classmates.
* This indicator relates most directly to SMP 3 but connects to other practices as well.
 |
| 1. **Materials provide opportunities for students to participate in regular conversation and collaboration with peers focused on lesson content.**
 | * In 2017, Massachusetts adopted speaking and listening standards applicable to math among other subjects at all grade levels. *Comprehension and collaboration* is the first cluster.
	+ Do materials adeptly facilitate the cultivation of students’ capacity to justify solutions to problems through proficient oral and written communication in diverse linguistic contexts, including during academic discourse?
 | * ELA/literacy curriculum framework: PK–12 anchor standards for speaking and listening (pp. [24](http://www.doe.mass.edu/frameworks/ela/2017-06.pdf#page=27), [134](http://www.doe.mass.edu/frameworks/ela/2017-06.pdf#page=137))
* [Math Guidelines: Area of Focus III; Mathematical Rigor Through Language](https://assets-global.website-files.com/5b43fc97fcf4773f14ee92f3/5e73a972f52c4e4007662b52_ELSF%20Math%20Guidelines.pdf) (The English Learner Success Forum, ELSF, p.12)
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| **Domain: Classroom Application** |
| **Criterion** | **Indicator** | **Notes and Tips** | **Further Reading** |
| **3. Accessibility for Students***Note:* While no one set of materials can serve all students’ needs, they should strongly support teachers tasked with doing so. Standard II of the [MA model teacher evaluation rubric](http://www.doe.mass.edu/edeval/model/PartIII_AppxC.pdf) sets expectations for teaching all students. | 1. **Materials provide for varied means of accessing content, helping teachers meet the diverse needs of students with disabilities and those working above or below grade level.**
 | * Consider whether materials provide differentiated strategies and/or activities to meet the diverse needs of students working below proficiency, English Learners (ELs), and those of advanced learners.
* Focus here on access to grade level content, not intervention or remediation.
* Consider whether materials provide [multiple means of representation](http://udlguidelines.cast.org/representation) and opportunities for collaborative learning (e.g., partner work).
* Consider intentional and varied points of access as an important strategy for ELs.
 | * Guidebook for Inclusive Practice, [Example Artifact List](http://www.doe.mass.edu/edeval/guidebook/5b-exartifacts.pdf): illustrates ways in which instructional materials can support *inclusive practice*, which encompasses Universal Design for Learning (the focus of these two indicators), Positive Behavioral Interventions and Supports, and Social and Emotional Learning
* [Universal Design for Learning Guidelines](http://udlguidelines.cast.org/?utm_medium=web&utm_campaign=none&utm_source=cast-about-udl) (CAST, 2018)
* [Math Guidelines: Area of Focus II; Scaffolding and Supports for Simultaneous Development](https://assets-global.website-files.com/5b43fc97fcf4773f14ee92f3/5e73a972f52c4e4007662b52_ELSF%20Math%20Guidelines.pdf) (ELSF, p.11)
 |
| 1. **Materials provide for varied means of demonstrating learning, helping teachers meet the diverse needs of students with disabilities and those working above or below grade level.**
 | * Consider whether materials provide students the support needed to succeed on tasks and activities, helping meet the diverse needs of students with disabilities, English Learners, and those below and above grade level.
* Focus here on demonstration of grade level learning, not intervention or remediation.
* Consider whether materials provide [multiple means of action and expression](http://udlguidelines.cast.org/action-expression) and opportunities for students to make choices.
* Materials should include multiple modes of assessment to demonstrate learning.
* Consider intentional means of demonstrating learning as an important strategy for ELs.
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| 1. **Materials help teachers ensure that students at various levels of English proficiency have access to grade level content, cognitively demanding tasks, and opportunities to develop academic language in English.**
 | * Materials should offer supports specific to ELs (e.g., references to cognates, as-needed scaffolding, and entry points to amplify—rather than simplify—complex language) as well as supports that benefit ELs among other learners (e.g., repeated exposure to academic vocabulary, and opportunities to develop academic language in English).
* Materials should support teachers to [develop ELs’ content knowledge and English proficiency simultaneously](https://wida.wisc.edu/sites/default/files/resource/Implementation-Guide-WIDA-ELD-Standards-Framework.pdf) by using the WIDA standards framework to identify the language expectations, forms, and features students need to communicate information, ideas and concepts necessary for academic success in the science content.
* Materials should support teachers to [differentiate language demands for ELs while maintaining cognitive demand](https://wida.wisc.edu/sites/default/files/resource/2012-ELD-Standards.pdf#page=13) and access to grade level content.
* Supports could be language specific, language family generalized, and/or inclusive of home languages.
 | * DESE’s [EL Blueprint for Success](https://www.doe.mass.edu/ele/blueprint/dashboard.html)
* [Guidelines for Improving Math Materials for ELs](https://uploads-ssl.webflow.com/5a5e93221338fa00010fc521/5b895eabfac9977d07bd3b57_ELSF_Math_Guidelines_03.pdf) (English Learner Success Forum)
* [The 2020 Edition](https://wida.wisc.edu/teach/standards/eld/2020) (WIDA Consortium)
* [Examples of relevant resources](https://wida.wisc.edu/resources/administrator-supplement-wida-eld-standards-framework-implementation-guide) (WIDA Consortium):
	+ Sensory supports (e.g., real-life objects, manipulatives, videos)
	+ Graphic supports (e.g., charts, tables, graphs, timelines)
	+ Interactive supports (e.g., pair and group work, software)
* On the importance of language support for ELs in math:
	+ [ELLs Count on Language Support in Math](http://www.ascd.org/publications/newsletters/education-update/apr18/vol60/num04/ELLs-Count-on-Language-Support-in-Math.aspx) (Varlas, 2018)
	+ [Math Instruction for English Language Learners](https://www.colorincolorado.org/article/math-instruction-english-language-learners) (Robertson)
 |
| 1. **Materials include questions and tasks that affirm and value diverse identities, backgrounds, and perspectives.**
 | Questions to consider:* Do the materials elevate diverse backgrounds, perspectives, languages, and identities to deepen learning?
* Do the materials challenge existing narratives about historically marginalized and historically centered or normed cultures including challenges rooted in systemic oppression?
* Do the materials promote recognition of the validity and worth of all cultures and languages?
* Do the materials provide factual, historical attributions for the development of concepts and applications related to the content?
* Consider whether the questions and tasks support students to:
	+ Actively draw upon students’ diverse backgrounds
	+ Make real-life connections
	+ Examine their own and others’ perspectives
	+ Help advance student thinking and actions about identity, equity, power, and oppression
 | * [Assessing Bias in Standards and Curricular Materials](https://greatlakesequity.org/resource/assessing-bias-standards-and-curricular-materials) (Coomer, Skelton, Kyser, Thorius, & Warren, 2017)
* [Education Week article and linked resources](https://www.edweek.org/ew/articles/2019/10/11/seattle-schools-lead-controversial-push-to-rehumanize.html?cmp=eml-eb-popweek-10182019&M=58958820&U=&UUID=46e852b9f6102a20a5264ce2d37d9dbf)
* [The Culturally Responsive-Sustaining STEAM Curriculum Scorecard](https://steinhardt.nyu.edu/sites/default/files/2021-02/CRSE-STEAMScorecard_FIN_optimized%20%281%29.pdf) (New York: Metropolitan Center for Research on Equity and the Transformation of Schools, NYU, 2021)
* [Culturally Responsive Curriculum (Hanover Research, 2020)](https://www.wasa-oly.org//WASA/images/WASA/6.0%20Resources/Equity/DISCUSSION%20GUIDE---CULTURALLY%20RESPONSIVE%20CURRICULUM.pdf)
* [Mathematics for Whom: Reframing and Humanizing Mathematics](https://educate.bankstreet.edu/cgi/viewcontent.cgi?article=1276&context=occasional-paper-series&_ke=eyJrbF9lbWFpbCI6ICJzdGVwaGVuLmdhcnNjaGluYS1ib2Jyb3dAbWFzcy5nb3YiLCAia2xfY29tcGFueV9pZCI6ICJKZUJXUmsifQ%3D%3D)
* [Culturally and Linguistically Sustaining Practices](https://www.doe.mass.edu/instruction/culturally-sustaining/default.html): MA DESE definition of cultural responsiveness and tools for professional development
* [Math Guidelines: Area of Focus IV; Leveraging Students' Assets](https://assets-global.website-files.com/5b43fc97fcf4773f14ee92f3/5e73a972f52c4e4007662b52_ELSF%20Math%20Guidelines.pdf) (The English Learner Success Forum, ELSF, p.13)
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| **4. Usability for Teachers***Note:* Materials should strongly support teachers in their everyday work. Standard I of the [MA model teacher evaluation rubric](http://www.doe.mass.edu/edeval/model/PartIII_AppxC.pdf) defines expectations for teachers related to curriculum, planning, and assessment. | 1. **Lessons and tasks advance student learning with clear purpose.**
 | Consider whether:* The intended purpose of each lesson and task is clear, and content and language learning are interdependent..
* Lessons and tasks serve their intended purposes effectively.
 | * [Principles for the Design of Mathematics Curricula: Promoting Language and Content Development](https://ul.stanford.edu/sites/default/files/resource/2021-11/Principles%20for%20the%20Design%20of%20Mathematics%20Curricula_1.pdf) (Stanford University)

[DESE is collecting samples of openly available curricular materials that exemplify various aspects of usability. To nominate a resource to be featured here, contact DESE-CURATE@mass.gov.]* [Math Guidelines: Area of Focus V; Assessment of Mathematical Content, Practice, and Language](https://assets-global.website-files.com/5b43fc97fcf4773f14ee92f3/5e73a972f52c4e4007662b52_ELSF%20Math%20Guidelines.pdf) (ELSF, p.14)
 |
| 1. **Materials support teachers with suggested classroom routines and structures (e.g., grouping strategies).**
 | * *Routines* might involve math vocabulary, fact fluency, mental math, number talks, or math manipulatives.
	+ *Routines* should encourage equitable and inclusive student participation that support the simultaneous development of language and content learning.
* *Structures* (e.g., pair work, math stations, talk protocols, speaking prompts, listening/note taking tools, group work roles) might be designed to broaden participation and cultivate collaboration among students, including English learners.
	+ Structures should be designed to broaden participation and cultivate collaboration among students, including English learners.
* Materials provide resources to support productive student discourse.
* Materials provide resources to actively avoid potential bias in grouping strategies.
 |
| 1. **Pacing is reasonable and flexible; the curriculum can be implemented effectively within a typical school year.**
 | Consider whether:* Time estimates for lessons and units are accurate.
* Required number of minutes per day and days per year are feasible.
* Flexible options exist for a variety of school schedules and unforeseen circumstances.
* Guidance is provided to make educated decisions for what resources and aspects of the lesson to be prioritized on a daily basis.
 |
| 1. **Materials include informal and formal assessments that help teachers measure learning and adjust instruction.**
 | Consider whether:* Assessments provide multiple opportunities to identify students’ misconceptions about taught skills or themes within and across units, and surface gaps in skills knowledge, including language learning.
* Materials guide teachers toward next steps based on assessment data (e.g., reteaching, reassessing, continued practice).
 |
| 1. **Materials include rubrics, exemplars, or other resources to help teachers set clear and high expectations for students.**
 | In addition to rubrics and exemplars, relevant resources might include: * Checklists for students to use in peer or self-assessments.
* Annotated student work at various levels of achievement, including non-exemplars, or student work at different levels of English development
* Guidance for the teacher to avoid bias in setting expectations for students.
 |
| 1. **Materials include guidance and resources designed specifically to build teachers’ knowledge.**
 | Relevant supports might bolster aspects of *content knowledge* (e.g., math vocabulary, fundamental math theory), *pedagogical content knowledge* (e.g., development of number sense or algebraic reasoning), and *inclusive and culturally and linguistically sustaining practice*.* Do the materials provide a range of supports for teachers that include both topic understanding, language development, and specific lesson/standards guidance?
	+ Formats might vary: consider callout boxes and annotations in lessons, videos of classroom instruction, implementation guides, and more.
* Do the materials support teachers to recognize their own pedagogical biases?
* Do the materials provide context for teachers to develop their sociocultural consciousness by contextualizing historical frames and providing various cultural developments for similar concepts?
* Do the materials provide teachers with guidance on how to approach, enhance, and customize lessons to be inclusive and responsive to the diverse identities of students, inclusive of linguistic, racial, ethnic, and gender diversity?
 | * Subject Matter Knowledge (SMK) Guidelines set expectations for Massachusetts educators’ content knowledge. Information about SMKs is available on DESE’s [educator preparation page](http://www.doe.mass.edu/edprep/resources/guidelines-advisories/).
* [Designing Educative Curriculum Materials to Promote Teacher Learning](http://www.project2061.org/research/ccms/site.archive/documents/Promote_Teacher_Learning.pdf) (Davis & Krajcik, 2005)
* [Culturally and Linguistically Sustaining Practices](https://www.doe.mass.edu/instruction/culturally-sustaining/default.html): MA DESE definition of cultural responsiveness and tools for professional development
* [Culturally Responsive Curriculum (Hanover Research, 2020)](https://www.wasa-oly.org//WASA/images/WASA/6.0%20Resources/Equity/DISCUSSION%20GUIDE---CULTURALLY%20RESPONSIVE%20CURRICULUM.pdf)
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| **5. Impact on Learning***Note:* For CURATE reviews, DESE’s research office determines ratings for this indicator and criterion. | 1. **Research demonstrates that the materials have a positive impact on student learning.**
 | * Research that meets expectations:
	+ Falls into evidence tiers 1, 2, or 3 as [defined by ESSA](https://www2.ed.gov/policy/elsec/leg/essa/guidanceuseseinvestment.pdf)
	+ Concerns the specific product under review, not just pedagogical strategies the product incorporates
	+ Is conducted by an independent, disinterested party
 | * DESE’s [“How Do We Know?” Initiative](http://www.doe.mass.edu/research/howdoweknow/) helps educators gather, assess, and use evidence to make informed decisions about programs and practices.
 |