Poll

What job roles are in the audience today?

a. K–12 public or charter school teachers

b. K–12 public or charter school administrators

c. University faculty

d. Evaluators or researchers

e. Other

Supporting English Learners in Math and Science: Effective Instructional Practices and Examples from NCELA's Teaching Briefs

U.S. Department of Education | June 30, 2021

Presenters

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Purpose for Today's Webinar

- Share practitioner-friendly resources
- Share research-based practices for teaching science and math
- Demonstrate ways of enacting these practices in ambitious instruction
- Offer a few ideas for distance learning environments

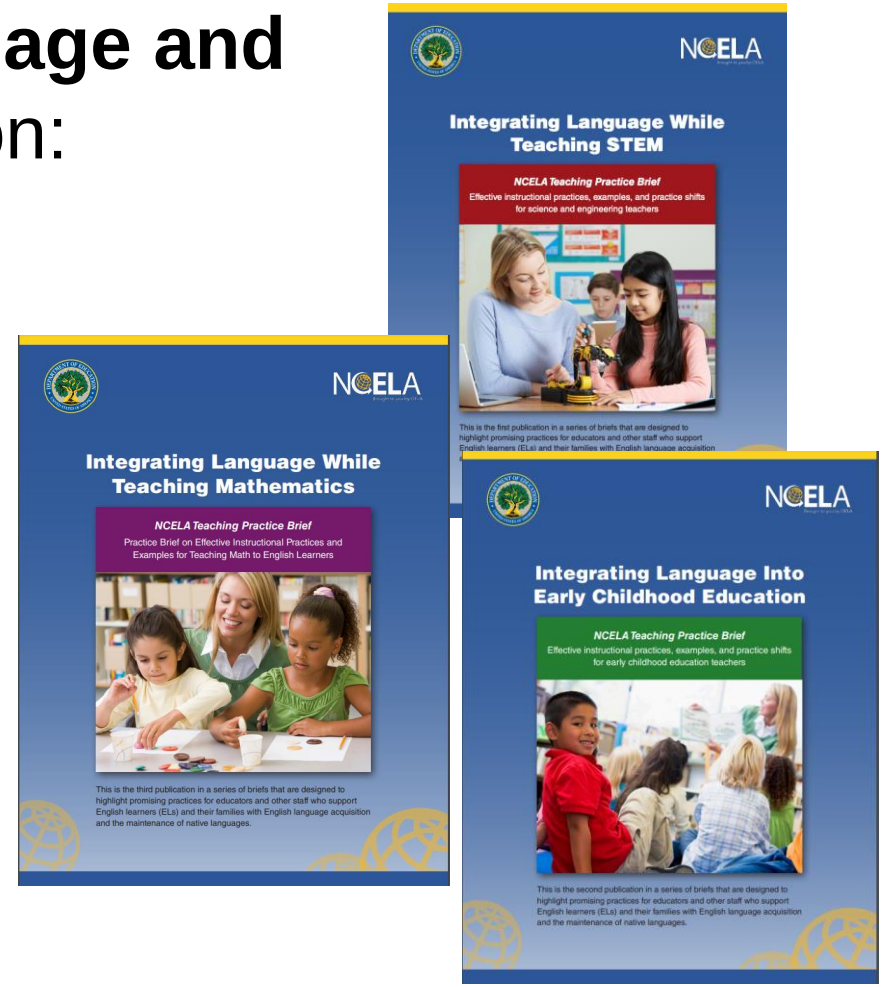
Agenda

- Context and Introduction to Teaching Practice Briefs
- Five Key Educator Practices for Science Instruction
- Engaging in Science Practices in a Lesson Sequence
- Five Key Educator Practices for Math Instruction
- Supporting English Learners to Engage in Meaningful Interactions through Jigsaw Projects

Some Background

Basis for Today's Webinar

- New resources focused on **integrating language and academic content** in three areas of instruction:
  - Science and Engineering
  - Math
  - Early childhood
- **Two types of resources** for each topic area:
  - Teaching practice briefs
  - Podcast discussions with topic experts



https://ncela.ed.gov/teacher-resources

About the Resources: Practice Briefs

- **What they are:** Brief (10–12 pages), educator-friendly, written documents.
- **What they contain:** Five research-based teaching practices, including:
  - A description of the practice
  - A real-life example of the practice in action
  - Suggestions and examples of tools and resources to support teachers' use of the practice
- **Who they are for:** Anyone interested in improving their instructional practices with English learners.

About the Resources: Podcasts

- **What they are:** Brief (20–25 minutes) podcasts.
- **What they contain:** A conversation between an OELA staff member and an expert from the field about the same four to five research-based teaching practices that are highlighted in the written briefs.
- **Who they are for:** Anyone interested in learning about the most up-to-date research-based practices for educating English learners.

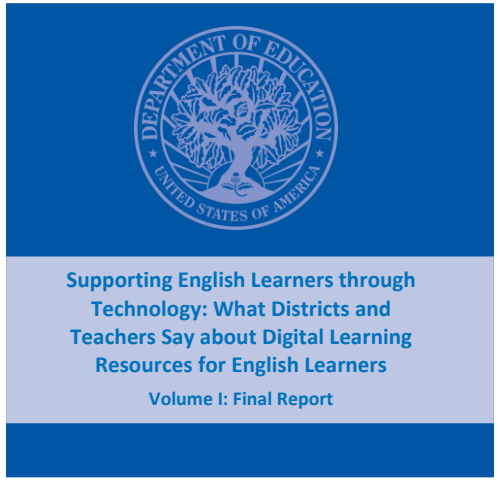
About the Resources: Today's Webinar

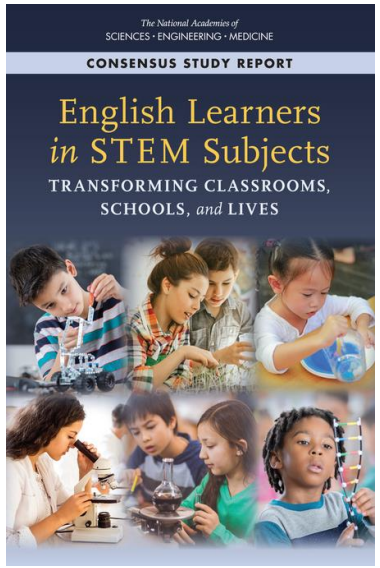
- **What it is:** Long-form (90 minute) webinar.
- **What it contains:** A review of the teaching practices from the science and mathematics briefs, followed by applied examples of how some practices might be implemented in distance-learning environments.
- **Who it is for:** Educators looking for ways to engage English learners in rigorous, inclusive in-person and distance-learning environments.

Teaching Practices for Science and Engineering

Five Key Educator Practices

1. Embrace asset beliefs that position and support English learners as full participants in disciplinary learning.
2. Engage English learners in science and engineering practices.
3. Engage English learners in meaningful interactions with other students and teachers.
4. Provide scaffolding as a way of supporting English learners' engagement and comprehension of challenging content.
5. Provide an explicit focus on how language works in the disciplines.





Science Key Practice #1: Embrace Asset Beliefs

- Teachers' beliefs about English learners:
  - Deficit beliefs
  - Asset beliefs
- Research indicates better learning outcomes when teachers acknowledge students' existing knowledge and skills.
- Teachers play a key role in providing English learners with opportunities to share their ideas, hence influencing others' perceptions of them as competent classroom community members.

Science Key Practice #2: Engage ELs in Science and Engineering Practices

What are science and engineering practices?

- asking questions and defining problems;
- developing and using models;
- planning and carrying out investigations;
- analyzing and interpreting data;
- using mathematics and computational thinking;
- constructing explanations and designing solutions;
- engaging in argument from evidence; and
- obtaining, evaluating, and communicating information.

Science Key Practice #3: Engage Students in Meaningful Interactions

- Language and content learning are inextricably linked.
- It is up to the teacher to create opportunities for students to engage in meaningful interactions.
- Working in groups is one way that students can engage in knowledge construction and language practices.

Science Key Practice #4: Use Scaffolding to Support Understanding of Rigorous Content

Scaffolding (one definition): *temporary support provided to English learners with the goal of developing students' autonomy.*

Walqui & van Lier (2010)

Two Types:

- Scaffolding that is planned in advance
  - e.g., providing students with carefully structured opportunities to interact
- Scaffolding that is provided in the moment
  - e.g., immediate feedback that is provided by the teacher which can help the student self-correct or successfully complete a task

Science Key Practice #5: Focus on How Language Functions in the Discipline

- Teachers of science are responsible for teaching science content **and** language.
- Multiple ways to accomplish this:
  - by drawing students' attention to the patterns present in language and how language is used in various scientific practices, and
  - by helping students to recognize linguistic choices they can make in different contexts.

Engaging in Science Practices in a Lesson Sequence

Science Practice: Asking Questions

How do we engage students in this practice?

- By showing them (using a demonstration or video) some sort of phenomenon and something that piques their interest and causes them to ask:
  - “Why does that happen?”, or
  - “What would happen if we changed one of the variables?”
- For example, one phenomenon that is commonly used in science classrooms is the “dropping of two objects at once” demonstration.

Engaging English Learners with a Phenomenon

In a distance learning environment, you can:

- Use a video, or
- Conduct a live demonstration.

What Do You See?

Prediction Matrix: What Do You Think Will Happen?

My predictions and questions	Predictions and questions my partner and I have	Questions we have after our group discussion
I predict that when two objects are dropped, _____. A question I have is _____.	We predict that when both objects are dropped, _____. Questions my partner and I have are _____.	

Possible Questions

- Will the balls hit the ground at the same time?
- How many times will the ball bounce?
- What will happen if you drop the balls from twice as high?
- Do the balls fall at the same speed?

Watch the Video Demonstration

Science Practice: Constructing Explanations

Which of the Two Texts Provides an Explanation?

Text A

When the ball hits the ground, it slows down. This creates a force that hits the ground. The ground pushes back, but not as strongly. So now the ball is being pushed upward and starts to go up. Gravity pulls down on the ball, so it slows down and eventually stops.

Text B

The ball is dropped and hits the ground. The ball then bounces up to its highest point and then falls down to the ground again. The ball bounces up again but not as high as the first time.

Constructing Explanations of New Phenomena

What happens if you stack the balls and drop them at the same time?

Why Does the Tennis Ball Bounce Much Higher than the Basketball?

Co-constructing and Comparing Explanations

- Students compose the first part of the explanation (e.g., First I saw _____. Then, I noticed _____. Next, _____. Finally, _____.)
- Students compose the second part of the explanation (e.g., This happened because _____.
- In small groups of four, students take turns sharing their explanations in round robin format.
- As a group, the students must create a consensus explanation of this phenomenon.

Distance Learning Variations

- Use videos and photos where you can't conduct an investigation or simulation.
- Provide students with opportunities to engage in interactions with peers using breakout rooms.
- Get feedback from students by having them type their comments into the chat.
- Use graphic organizers to capture students' developing learning.

Teaching Practices for Math

Five Key Educator Practices

1. Embrace asset beliefs that position and support English learners as full participants in mathematical learning.
2. Engage English learners in meaningful interactions and discourse with others.
3. Provide support for English learners to engage in mathematical practices.
4. Sustain an explicit focus on language as it is used in mathematics.
5. Design mathematical learning experiences that engage English learners in abundant communications integrating oral and written language.

Math Key Practice #1: Embrace Asset Beliefs about English Learners

- English learners bring multiple strengths from their lived experiences:
  - Language
  - Culture
  - Communities
- If teachers focus on students' multiple assets, they can design instruction that bridges to mathematical content.

Math Key Practice #2: Engage English Learners in Meaningful Interactions

- English learners can benefit from **quality interactions** with their peers and teacher. This means:
  - Sustained talk that enables students to expand upon their ideas in depth.
- Interactions are **reciprocal** when students respond to each other as they build upon each other's ideas.
- Teachers can engage their English learners in quality interactions by enacting discourse moves that invite students to elaborate or respond to others.

Math Key Practice #3: Engage English Learners in Mathematical Practices

- New standards in mathematics have focused on **practices—** what mathematicians do.
- Because mathematical practices are complex, constituted of finer-grained practices, English learners can benefit from being offered clear choices among these practices.
- English learners can benefit from being offered explicit models of language to engage in these practices.

Math Key Practice #4: Sustain Explicit Focus on Language as It Is Used In Math

- English learners can benefit from targeted supports as they solve story problems.
- Often, story problems do not explicitly identify variables (e.g., “How many feet of ribbon will you need?” does not name the variable of length).
- If English learners have structured opportunities to discuss problems with their peers, they can better understand and formulate solution approaches.

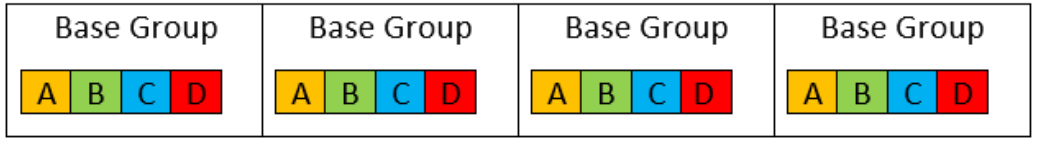
Math Key Practice #5: Engage English Learners to Integrate Oral And Written Language

- As English learners deepen their understanding over the course of a lesson, they can engage in reading, writing, speaking, and listening to each other.
- Well-structured tasks can integrate oracy (speaking and listening together) with literacy (reading and writing together).
- English learners can grow toward communicating in ways that are more extended, more expert, and more technical.

Supporting English Learners to Engage in Meaningful Interactions through Jigsaw Projects

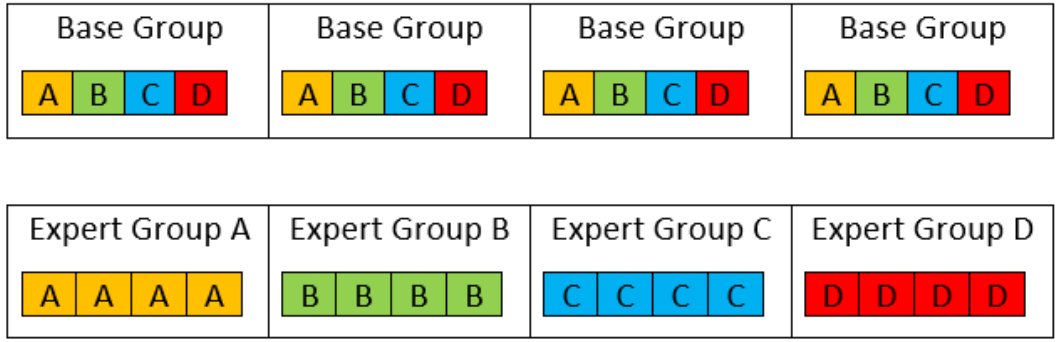
Setting the Stage in Base Groups

- First, students start in base groups.
- In their base groups, they engage in activities that launch a mathematical investigation



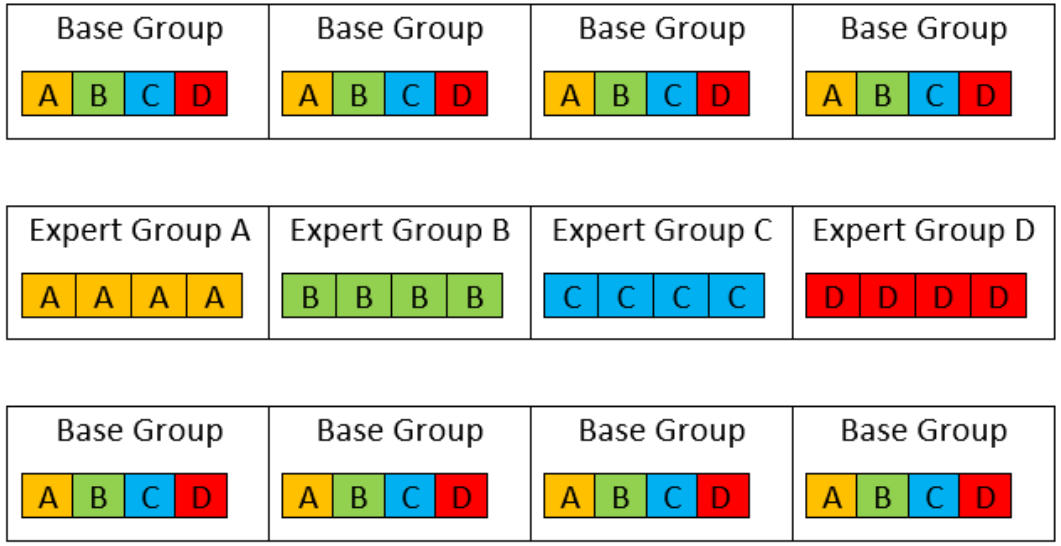
Becoming Experts Together

- Then, students move into expert groups where they explore a problem, representation, or text in depth.
- In their expert groups, students reach a consensus about the most important points or ideas to share.



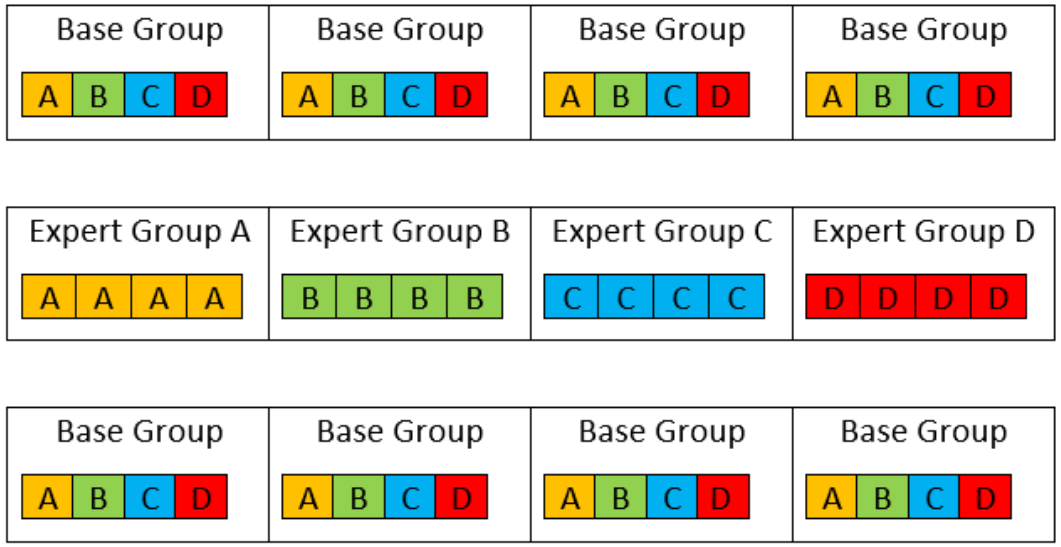
Comparing and Contrasting Cases

- Finally, students return to their base groups, where they report as experts.
- In base groups, students identify key similarities and differences across cases or problems.



Multiple Opportunities to Interact in a Jigsaw

- In base groups, students first surface relevant prior knowledge and hypotheses.
- In expert groups, students develop voice and authority about cases.
- In base groups, students identify key categories of similarity and difference.



Jigsaw Distance Learning Variations

- Synchronous and concurrent base and expert groups
- Staggered synchronous base and expert groups
- Digital bulletin board of base group reporting; synchronous conference

Revisiting the Math Teaching Practices

1. Embrace asset beliefs that position and support English learners as full participants in mathematical learning.
2. Engage English learners in meaningful interactions and discourse with others.
3. Provide support for English learners to engage in mathematical practices.
4. Sustain an explicit focus on language as it is used in mathematics.
5. Design mathematical learning experiences that engage English learners in abundant communications integrating oral and written language.

Discussion, Questions, and Wrap-Up

References for the Research Briefs

English Learners in STEM Subjects: Transforming Classrooms, Schools, and Lives (2018 NASEM Report)

Educator Toolkit: Using Educational Technology—21st Century Supports for English Learners (2018 ED PPSS Report)

Promoting the Educational Success of Children and Youth Learning English: Promising Futures (2017 NASEM Report)

Teaching Academic Content and Literacy to English Learners in Elementary and Middle School (IES Practice Guide, 2014)

Effective Literacy and English Language Instruction for English Learners in the Elementary Grades (2007 IES Practice Guide)

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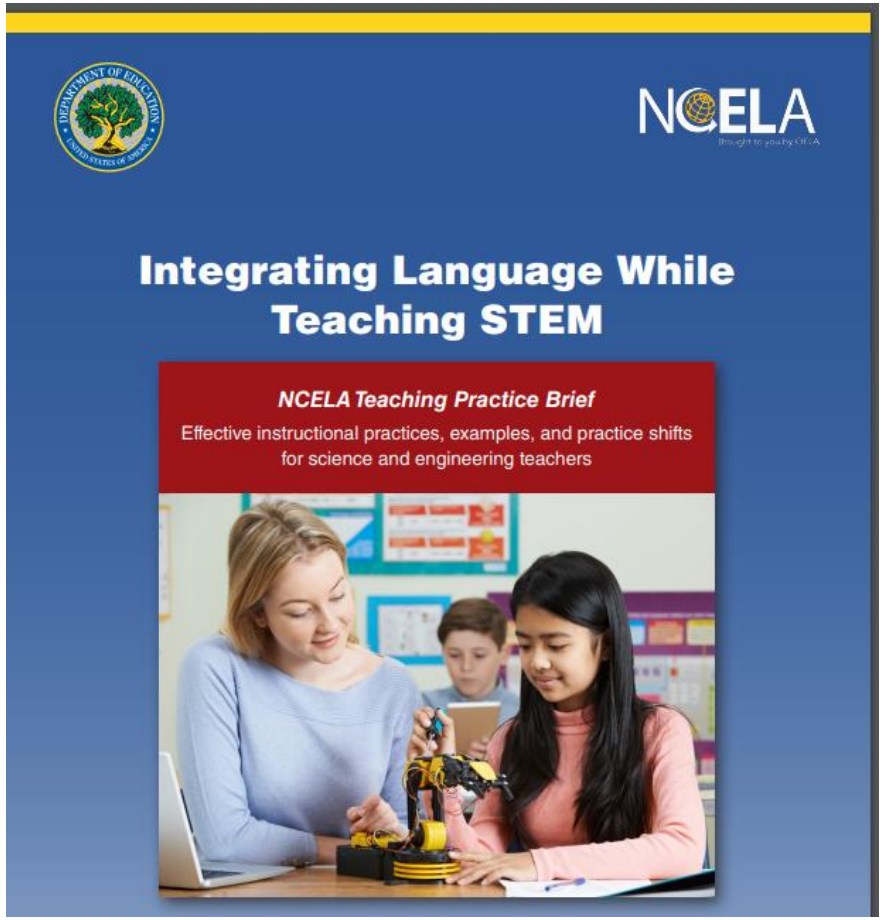
Where to Find the Resources: Science

National Clearinghouse for English Language Acquisition

https://ncela.ed.gov/

Science Brief:
https://ncela.ed.gov/files/briefs/TeachingPracticeBrief-Science-06292020-508.pdf

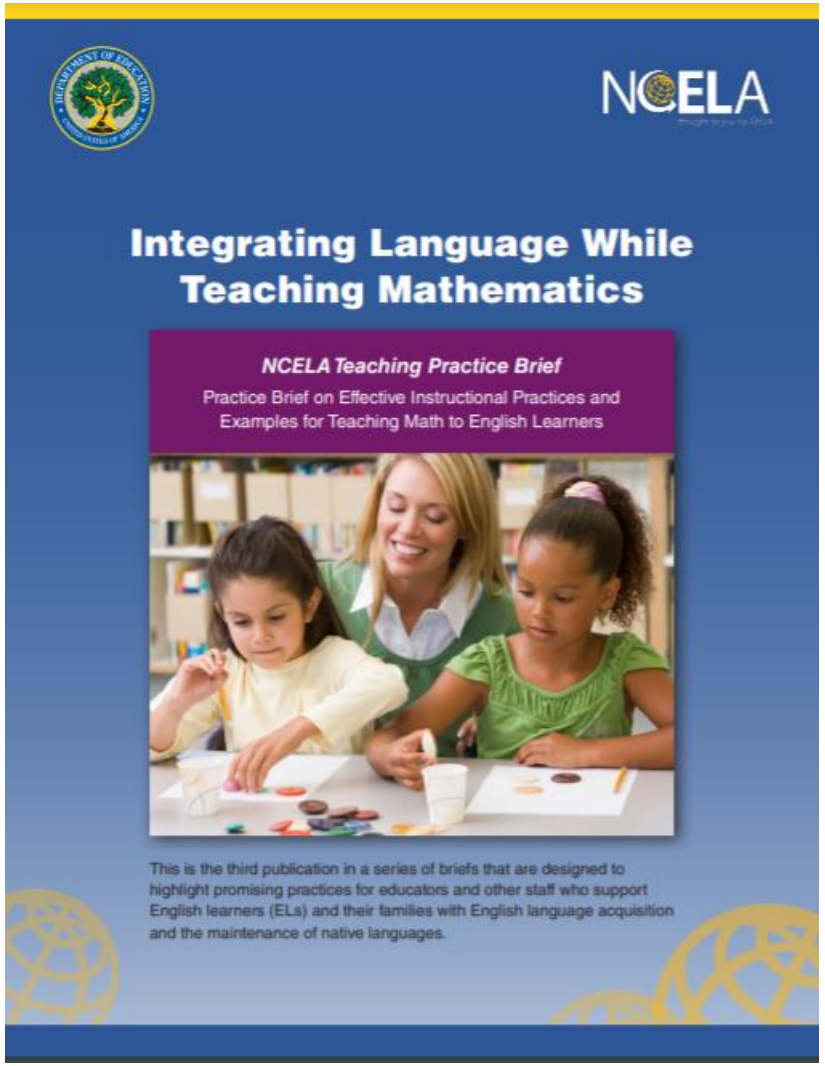


Where to Find the Resources: Math

National Clearinghouse for English Language Acquisition

https://ncela.ed.gov/

Math Brief:
https://ncela.ed.gov/files/briefs/20210125-Math-Brief-508



Resources: *New NCELA Webpage*

NEW: Ensuring Continuity Of Learning And Operations

View Edit Manage display Revision operations Convert

The Office of English Language Acquisition (OELA), knows how important it is that districts and schools have access to resources that recognize the unique learning profiles and needs of English learners in order to facilitate their education during unplanned school closures.

These resources are intended for school personnel and institutions of higher education to improve distance learning and the support of English learners and their families during school closures. All resources are free. Additional resources will be added, please check back periodically. To submit resources for consideration, please complete the Remote Learning Resources Submission Form

https://ncela.ed.gov/new-ensuring-continuity-learning-and-operations

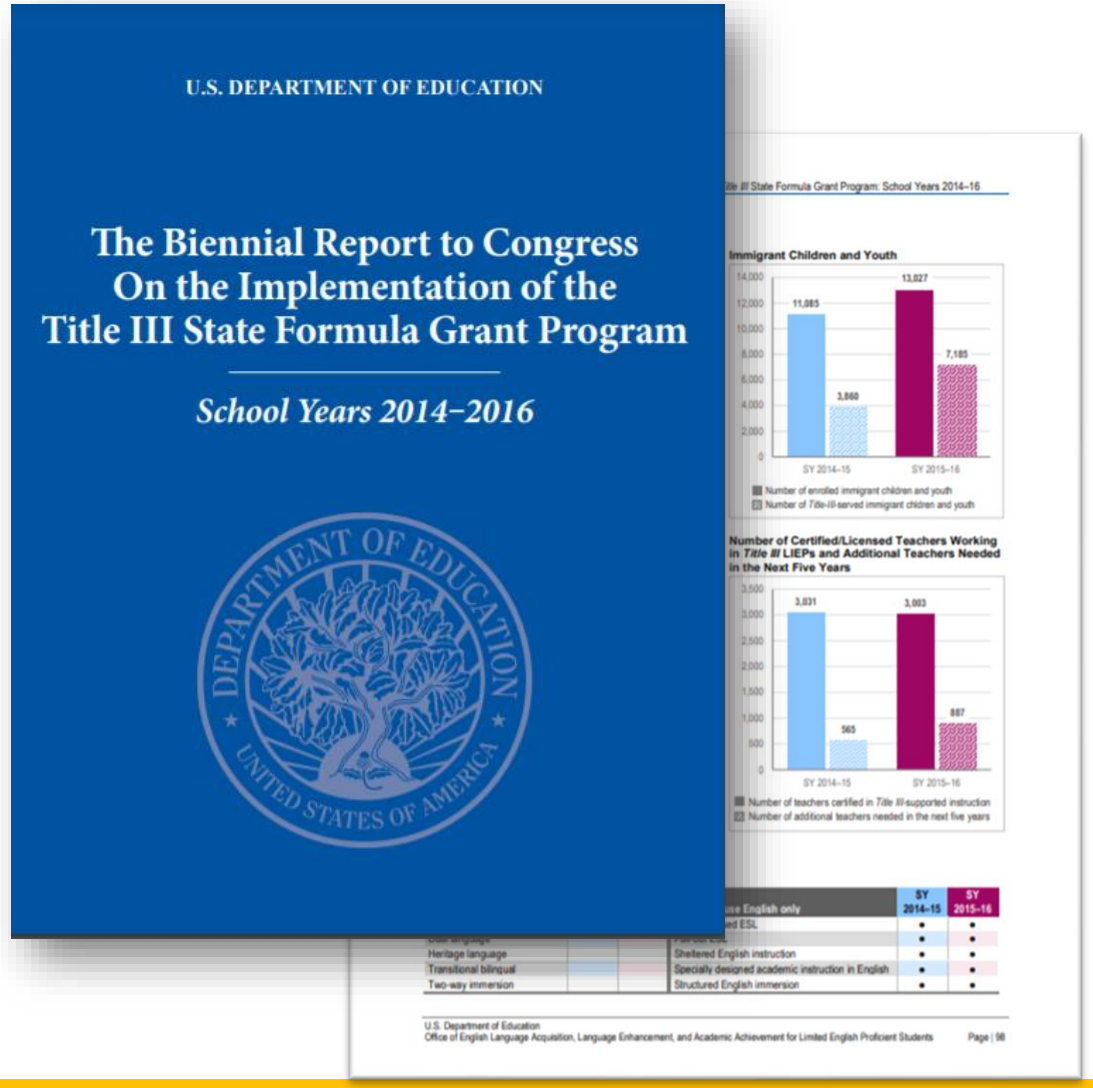
Resources Related to Resuming In-Person Learning

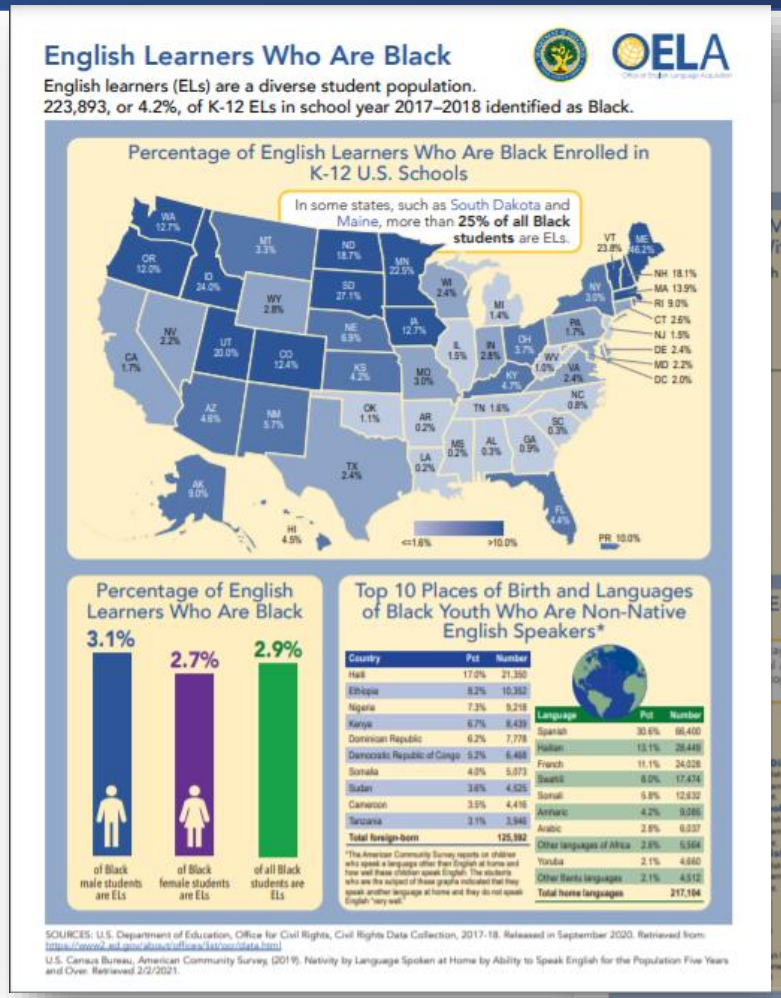
- ED COVID-19 Handbook Roadmap to Reopening Safely and Meeting All Students' Needs:
  - https://www2.ed.gov/documents/coronavirus/reopening-2.pdf
- Teachers and Staff Resuming In-Person Learning
  - https://www.cdc.gov/coronavirus/2019-ncov/community/schools-childcare/resources-teachers-staff/in-person-learning.html\
- Reopening Schools During COVID-19
  - https://maec.org/reopening-schools/

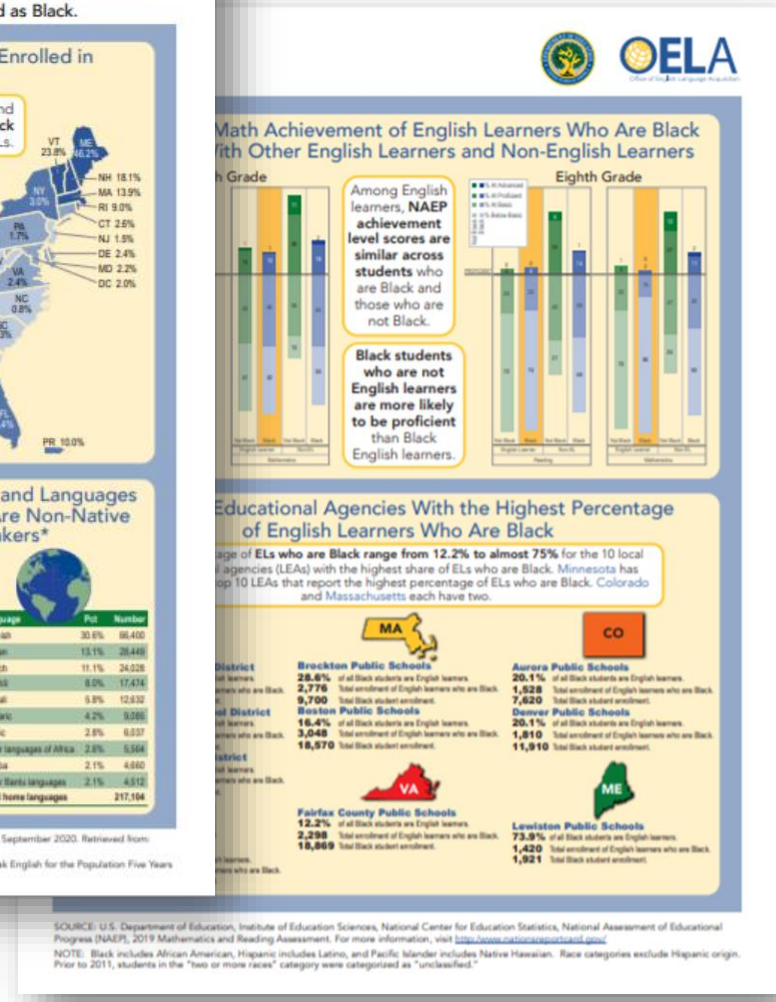
OELA Webinars

- English Learners in Secondary schools: Trajectories Points, and Promising Practices
  - https://vimeo.com/540799924/a14380e27d
- Upcoming Webinar: **Enhancing language Instruction in Early Childhood Education: Effective Practices and Examples from NCELA's Teaching Briefs**
  - **July 8 at 2:30 pm ET**
  - **Register now at: https://zoom.us/webinar/register/WN_uZg31aioQY-818x5uPP5-w**

New Publications







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- **NCELA on SoundCloud:**
  - https://soundcloud.com/ed_oela

Q & A

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Thank You!