

SCIENCE INSTRUCTION FOR STUDENTS WITH SIGNIFICANT COGNITIVE DISABILITIES

VESOL Instruction Webinar

Module 2

2022-2023

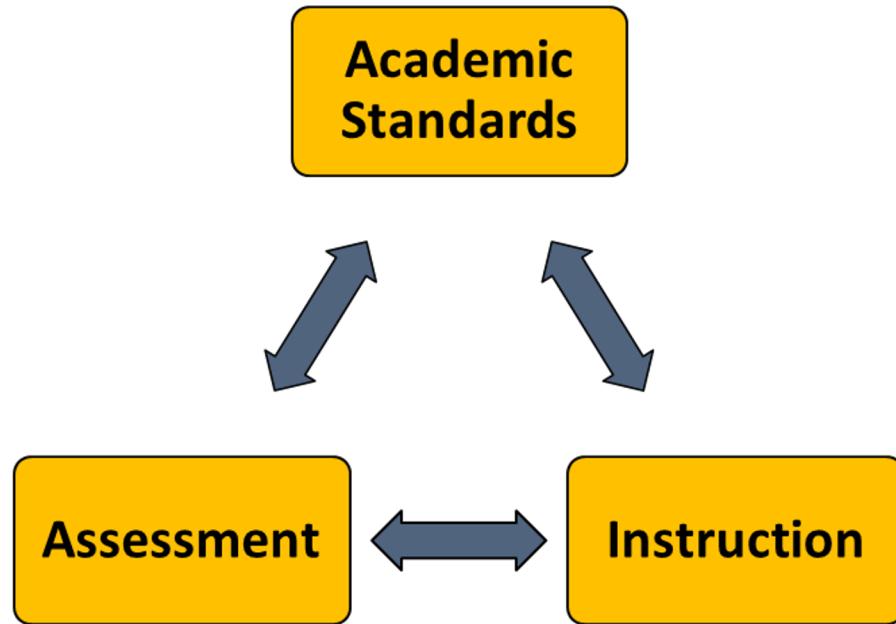


VIRGINIA DEPARTMENT OF EDUCATION

ACADEMIC EXPECTATIONS FOR STUDENTS WITH SIGNIFICANT COGNITIVE DISABILITIES

To meet academic expectations, classrooms must reflect the important connection and alignment between:

- Content (academic standards),
- Teaching of content (instruction) and
- Evaluation of learning (assessment).



Each element is inter-related and they must be closely aligned, work together, and reinforce one another.

VIRGINIA ESSENTIALIZED STANDARDS OF LEARNING (VESOL)

- The VESOL are academic content standards for reading, mathematics and science that are derived from the SOL but reduced in depth, breadth and complexity.
- The VESOL were developed by VDOE staff in partnership with Behavioral Research and Teaching (BRT) at the University of Oregon and Virginia special educators from 27 school divisions.
- VESOL for reading and math are available for grades 3-8 and high school.
- VESOL for science are available for grades 5, 8, and high school
 - Grade 5 VESOL are taught in grades 4 and 5
 - Grade 8 VESOL are taught in grade 6, 7, and 8.
- VESOL are available on the VAAP Page of the Virginia Department of Education website.

SCIENCE VESOL INSTRUCTION MODULE SCHEDULE

- 10/19/2022: 9:30 – 11:00 AM
- 10/19/2022: 12:30 – 2:00 PM
- 10/20/2022: 3:00 – 4:30 PM
- 10/24/2022: 10:30 AM – 12:00 PM
- Reading and Mathematics VESOL Instruction modules coming soon!

ABOUT THIS VDOE VESOL MODULE

- During this module, please wait until the end of the presentation to submit your questions since some may be answered during the presentation.
- Questions may be submitted to Virginia Department of Education (VDOE) staff using the Q & A feature located at the bottom of your screen.
- This module will be recorded and available on the VDOE website after all presentations are completed.
- Due to the number of participants, Certificates of Participation will not be issued by VDOE.

THE PURPOSE OF THIS WEBINAR

This webinar is designed to support teachers in Science VESOL instruction. Topics addressed in this webinar include:

- Unpacking science VESOL for classroom instruction
- Providing meaningful, relevant and highly engaging science instruction for students with significant cognitive disabilities
 - using embedded vocabulary development and inquiry strategies, assistive technology and augmentative and alternative communication supports
- Addressing multiple grade level and content area VESOL through thematic instruction
- Answering Frequently Asked Questions

Unpacking the Science VESOL

For Effective Classroom Instruction

SCIENCE VESOL REPORTING CATEGORIES

Grade 5 (18 VESOL)	Grade 8 (22 VESOL)	High School (9 VESOL)
Living Systems and Ecosystem Interactions	Life Systems and Ecosystems	Life at the Molecular/Cellular and Systems/Organisms Level
Earth/Space Systems and Earth Resources	Earth and Space Systems	Interactions of Life Forms and Ecosystem Dynamics
Force, Motion, Energy, and Matter	Force, Motion, Energy, and Matter	

Science instruction happens in all grade levels; tested in grades 5, 8 and HS

START WITH THE COMPLEXITY CONTINUUM

S-HS 2:

The student will recognize that plants need light, air, and water to grow and create energy through photosynthesis.

Complexity Continuum:

Using simple pictures, diagrams, or representations, concepts could range from:

- recognizing the difference between light, air, and water and that plants need them to survive and grow to
- recognizing the term and role of **photosynthesis** and characterizing or comparing the growth of a plant, tree, or flower when different amounts of light, air, or water are provided to
- recognizing plant parts associated with the basic inputs (water, sunlight, carbon dioxide) and outputs (oxygen, sugar) of photosynthesis (e.g., roots take in water during photosynthesis, leaves take in sunlight during photosynthesis, leaves release oxygen during photosynthesis).

WHAT IS THIS SCIENCE VESOL ABOUT?

Unpacking Resources

- General Education Colleagues
- [VESOL Science Crosswalk](#)
- [SOL BIO. 2a-e](#)

...e)the processes of photosynthesis and respiration include the capture, storage, transformation, and flow of energy.
- [Curriculum Framework](#)

Questions to Answer

- What do students need to KNOW?
- What do students need to UNDERSTAND?
- What do students need to DO?
- What PREREQUISITES are needed?
- What REPRESENTATIONS are used?
- What are common MISCONCEPTIONS?
 - (CEC, 2019)

UNPACKING S-HS 2

What do students need to know and understand?	What do students need to do?	What are earlier science VESOL connections?	Representations needed?	What vocabulary is part of this VESOL?
-Plants need air, water and light to grow -Photosynthesis -Amount of air, water and light affects plant growth Plant parts have specific functions	-recognize air, water and light -compare plant growth with varied amounts of sun, light and/or water -recognize plant parts and their function	S-5 1 S-5 2 S-8 10 S-8 11 S-8 12 (SOL 4.2a-c) (SOL LS. 3a-c) (SOL LS. 4a-b)	real plants, water, light, 3D models, pictures, symbols, words	air, water, light, sun plant, flower, tree photosynthesis roots, stem, leaf oxygen, carbon dioxide, sugar

Planning VESOL Science Instruction

That is Meaningful, Relevant and Engaging for Students

MYTHS

- Investigative science instruction is not appropriate for students with significant cognitive disabilities.
- Students who do not communicate verbally cannot comprehend or explain science concepts and processes.
- Science instruction for students with significant cognitive disabilities is offered as enrichment, not core instruction.
- It is impossible to teach science to students in multiple grade levels.
- There are no science instructional resources for my students.

RIGOROUS SCIENCE EDUCATION FOR ALL



MEANINGFUL, RELEVANT, AND ENGAGING VESOL SCIENCE INSTRUCTION

Science instruction for students with significant cognitive disabilities includes:

- real-world connections
- hands-on authentic learning experiences
- inquiry and experimentation
- embedded assistive technology and augmentative and alternative communication supports
- Generalization, frequent application and review opportunities

Jimenez, B., & Henderson, K (2012)

S-5 4 EARTH/SPACE SYSTEMS AND EARTH RESOURCES

The student will:

Recognize different types of weather conditions and their characteristics.

Complexity Continuum: Using simple pictures, diagrams, or representations, concepts could range from:

- recognizing simple weather conditions (rainy, cloudy, sunny, foggy, thunder and lightning) to
- connecting physical conditions to weather conditions (e.g., wet to rain, dry or hot to sunny, lightning to thunderstorm) to
- identifying more complex storm conditions (e.g., hurricane, tornado, blizzard) and their physical conditions.

S-5 4 WEATHER SAMPLE LESSON

Introduce the Lesson

- Gather students near a window or outside
- Open gym bag or suitcase with apparel for varied weather conditions
- Invite each student to select an item
- Ask students if that item is needed for today's weather condition
- Introduce VESOL inquiry, "What is today's weather?"

Introduce VESOL Vocabulary

Use differentiated materials matched to students' communication systems

- Real objects
- Photographs of weather conditions
- communication symbols for weather conditions
- words

EMBED VOCABULARY INSTRUCTION

- Vocabulary instruction provides students with the language to communicate about and discuss science concepts they are learning
- It is also important that science lessons extend beyond only vocabulary acquisition

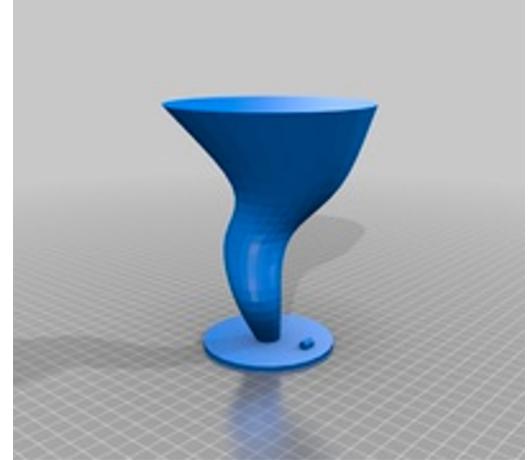
On-going vocabulary development activities include:

- Core Vocabulary
- Personal dictionaries
- Science vocab book
- Word Wall
- Flash cards
- Matching activities

EMBED AAC SUPPORTS

Tactile object examples:

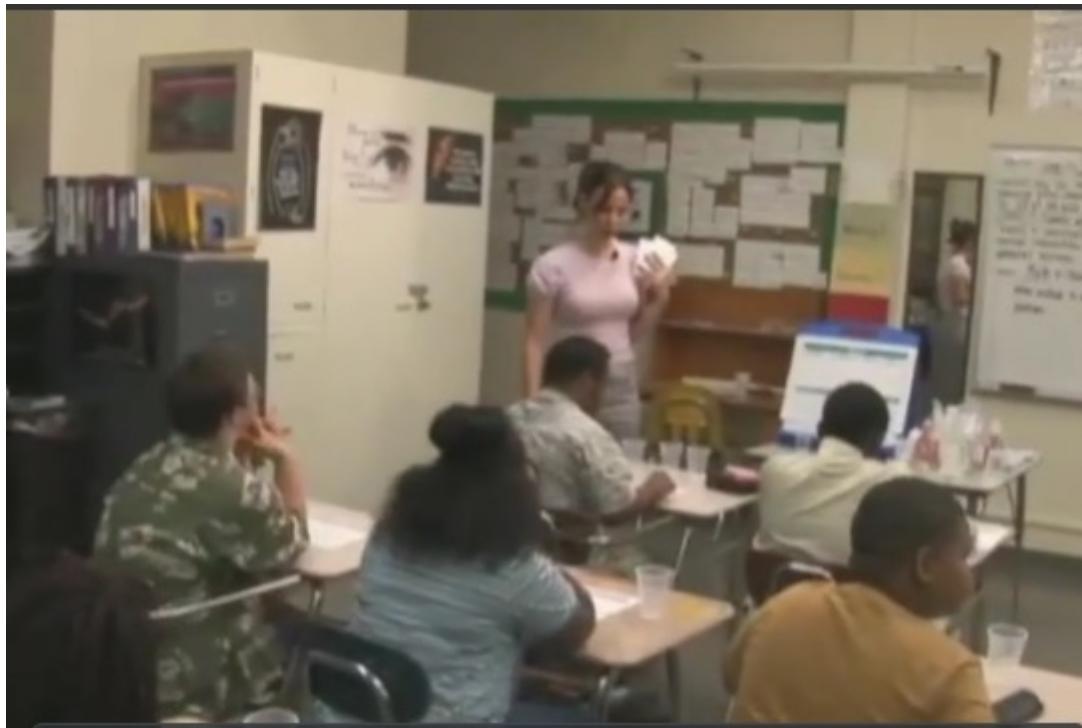
- wet sponge-rain
- ice cube or freezer pack-cold
- sock from dryer- hot
- 3d printed visuals



AAC users can utilize vocabulary specific topic boards

- low tech: boards printed on a paper/cardstock
- mid tech: devices featuring multiple cells / buttons (GoTalk 9, Talkable II)
- high tech: customizable AAC software (Proloquo, TouchChat)

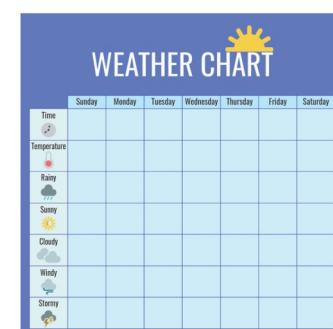
SAMPLE VOCABULARY FORMATIVE ASSESSMENT



[https://mast.ecu.edu/Science/Science%20Instruction%20\(Students%20with%20Significant%20Intellectual%20Disabilities\)/index.html](https://mast.ecu.edu/Science/Science%20Instruction%20(Students%20with%20Significant%20Intellectual%20Disabilities)/index.html) (slide 25)

PROVIDE AUTHENTIC LEARNING EXPERIENCES

- Create weather and conditions chart
- Recognize and identify the weather conditions each day
- Record and visually display weather conditions each day
- Invite students to watch the weather news with their families at home and return to school with a weather forecast card
- Practice matching TV weather predictions to current conditions
- Complete weather books, dictionaries, matching activities



ENGAGE IN SCIENTIFIC INQUIRY AND RESEARCH

Inquiry

- Place a thermometer outside
- Students record current weather observations
- Students predict what weather conditions or temperature will be the following day

Research

- Investigate books, websites and videos portraying severe weather conditions
- Create “[Weather in a Jar](#)” to match what is discovered about severe weather conditions

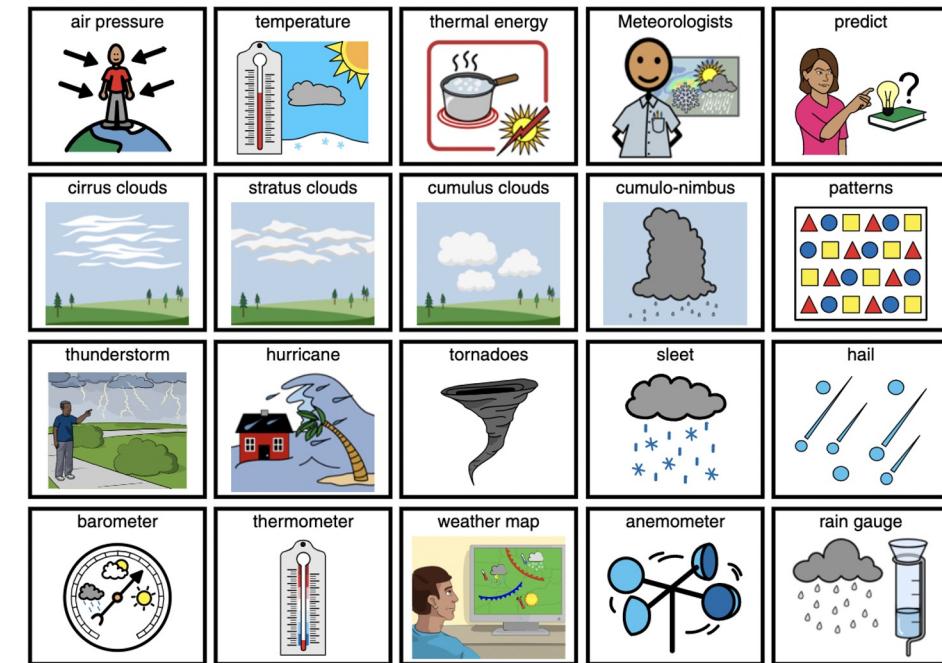
EMBED ASSISTIVE TECHNOLOGY SUPPORTS

Options for Access:

Use what is already familiar:

- Touch screen
- Adapted mice and keyboards
- Eye gaze frame
- Recordable switches with built in scanning
- [VESOL AT and AAC resources on TTAC online](#)

Weather



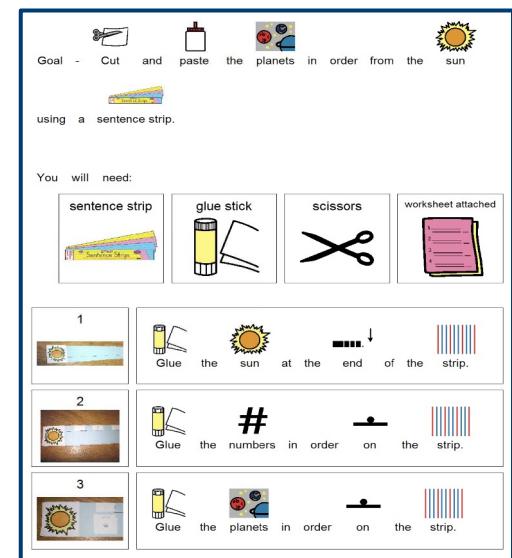
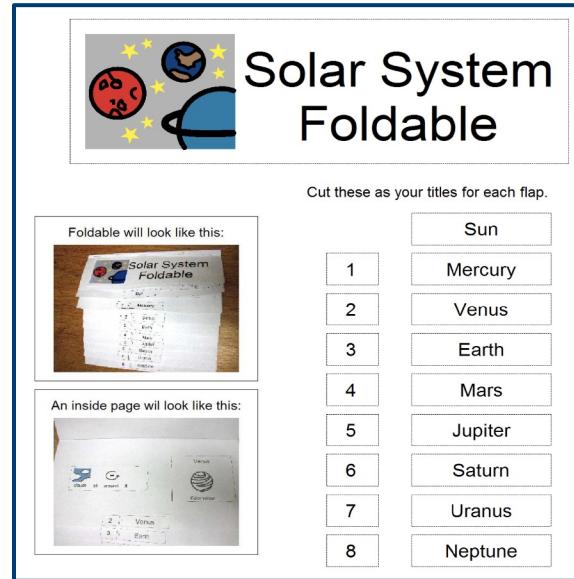
SAMPLE GROUP SCIENCE EXPERIMENT



[https://mast.ecu.edu/Science/Science%20Instruction%20\(Students%20with%20Significant%20Intellectual%20Disabilities\)/index.html](https://mast.ecu.edu/Science/Science%20Instruction%20(Students%20with%20Significant%20Intellectual%20Disabilities)/index.html), slide 30

GENERAL EDUCATION AND FAMILY COLLABORATION

- General educators can provide a wealth of ideas and resources to support hands-on science experiments and learning activities
- Visuals for vocabulary and definitions can be shared with general education colleagues and families to support the learner in different environments and provide increased practice opportunities
- *Sometimes general education teachers see VESOL science resources and want to use them with all students!*



FORMATIVE ASSESSMENT AND CONTINUOUS REVIEW

- Embed “recognizing different types of weather conditions and their characteristics” into daily school morning routine
- Ask students to identify weather conditions and characteristics in literature and movies they read and watch
- Ask students to identify weather conditions and characteristics in travel brochures and pictures of places they and others have traveled
- Ask students to describe how it looked, sounded and felt when they return from being outside
- Ask students what clothing or accessories are needed given the current weather conditions

TTAC ONLINE SAMPLE ACTIVITIES

Reporting Category	VESOL ID	Virginia Essentialized Standard of Learning	ASOL #	Aligned Standard of Learning (ASOL)	ASOL Sample Lesson	Applied Studies Competencies
Earth/Space Systems and Earth Resources (ESSER)	S-5.4	Recognize different types of weather conditions and their characteristics.	5S-ESS.1	The student will investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include a) weather phenomena; b) weather measurements and meteorological tools; c) use of weather measurements and weather phenomena to make weather predictions	Characteristics of Weather Severe Weather Alert Twisting Tornadoes Understanding Common Storms Design and Build Your Own Turbine	Weather (SCI-WEA)

- 5th grade science - Hide Sample Activities
 - S-5.1 What Plants Need
 - [PDF - ADA Compliant Version](#)  or [Word - ADA Compliant Version](#) 
 - S-5.4 Recognize Different Types of Weather
 - [PDF - ADA Compliant Version](#)  or [Word - ADA Compliant Version](#) 
 - S-5.5 Recognize and Compare Objects in the Solar System
 - [PDF - ADA Compliant Version](#)  or [Word - ADA Compliant Version](#) 

Addressing Multiple VESOL and Grade Levels Through Thematic Instruction

THEMATIC INSTRUCTION

Organizes curriculum and instruction around a central theme to:

- Engage learners through high interest topics
- Offer meaningful and relevant learning contexts
- Connect to prior knowledge and real life experience
- Facilitate aligned and integrated instruction
- Provide learning opportunities in multiple domains
- Promote authentic communication and literacy skills
- Embed formative assessment and review
- Expand collaboration with general education colleagues
- Enhance family engagement

Cooper-Duffy (2010), Kovalik (1994), Reutzel (1997), Smith (2009) Vardell (1995), Varutli (2006)

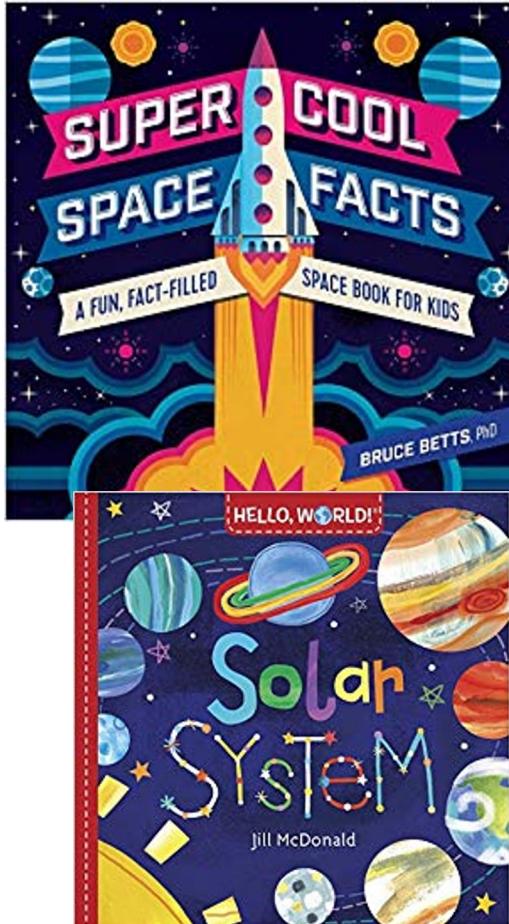
MULTIPLE VESOL THEMATIC INSTRUCTION

- Address multiple VESOL across **multiple domains**
 - Science
 - Reading
 - Mathematics
- Address multiple VESOL across **multiple grades**
 - Vertical articulation
 - Spiral instruction across grade levels
- Increased opportunities to respond for all VESOL
- Naturally occurring review opportunities for previously learned VESOL

SAMPLE 8TH GRADE SCIENCE VESOL TOPICS

Plants and Animal	S--8 10, S-8 11, S-8 12, S-8 13, S-8 14, S-8 16. S-8 17, S-8 18
Solar System	S-8 1, S-8 2, S-8 3,
Weather	S-8 4, s-8 6
Natural Resources	S-8 8, S-8 9, S-8 15
Water	S-8 5, S-8 7
Matter and Energy	S-8 19, S-8 20, S-8 21, S-8 22

VESOL S-8 1 RECOGNIZE AND COMPARE OBJECTS IN THE SOLAR SYSTEM AND THEIR FEATURES



Complexity Continuum:

Using simple pictures, diagrams, or representations, concepts could range from:

- recognizing the sun, Earth, and moon as compared to everyday objects on Earth to
- recognizing the sun, Earth, and moon as compared to other related objects in the solar system to
- comparing characteristics (e.g., size, shape, position, composition) of various space objects (e.g., sun, Earth, moon, planets, comets, asteroids) in the solar system.

SCIENCE VESOL CONNECTIONS ACROSS GRADES

S-5 5 Recognize and compare objects in the solar system and their features.

Complexity Continuum:

- recognize the sun and Earth as compared to common unrelated objects on Earth
- recognize the sun and Earth as compared to other objects in the solar system
- compare simple physical characteristics (e.g., size, shape) of objects in the solar system

S-5 6 Recognize the relationships between Earth, the moon, and the sun.

Complexity Continuum:

- recognize Earth and moon, including its phases, compared to other common, unrelated objects on earth
- recognize Earth, the sun, and the moon using their relative sizes and positions
- understand the concept and terminology of orbit and revolution.

SAME GRADE READING VESOL CONNECTIONS

Reading R-8 1

The student will:

Understand the meaning of words in nonfiction passages that are read to the student or that the student reads.

Complexity Continuum:

The words could be shown with or without a graphic representation or could appear in a sentence.

Reading R-8 3

The student will:

Answer questions about a nonfiction text that is read to the student or that the student reads.

Complexity Continuum:

The nonfiction text could range from three medium sentences with five to seven words to a paragraph with five to seven sentences.

VESOL READING CONNECTIONS ACROSS GRADES

Reporting Category: Demonstrate comprehension of nonfiction texts

R-3 1, R-4, R-5 1,R-6 1, R-7 1, R-8 1, R-HS 1:

Understand the meaning of words in passages that are read to the student or that the student reads

[AIM-VA](#) provides accessible instructional materials to eligible Virginia K-12 students who have an Individualized Education Program (IEP) and are unable to access traditional print.

ALIGNED READING AND SCIENCE VESOL INSTRUCTION

R-5 3: Answer questions about a nonfiction text...

Which planet is red?

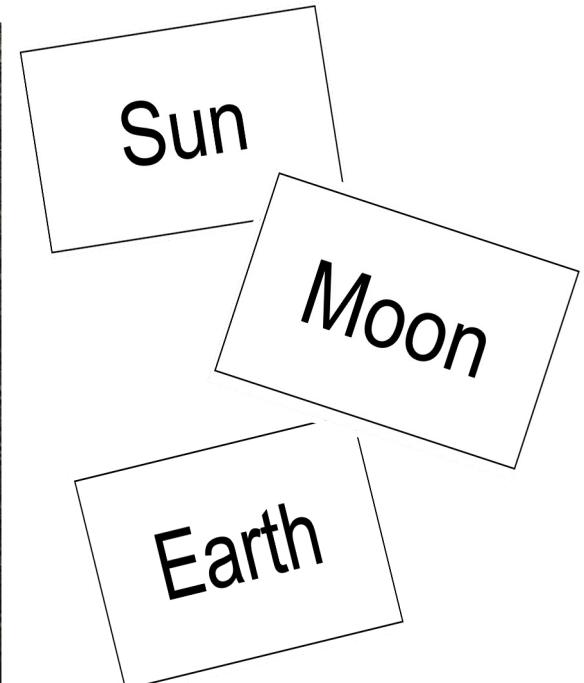
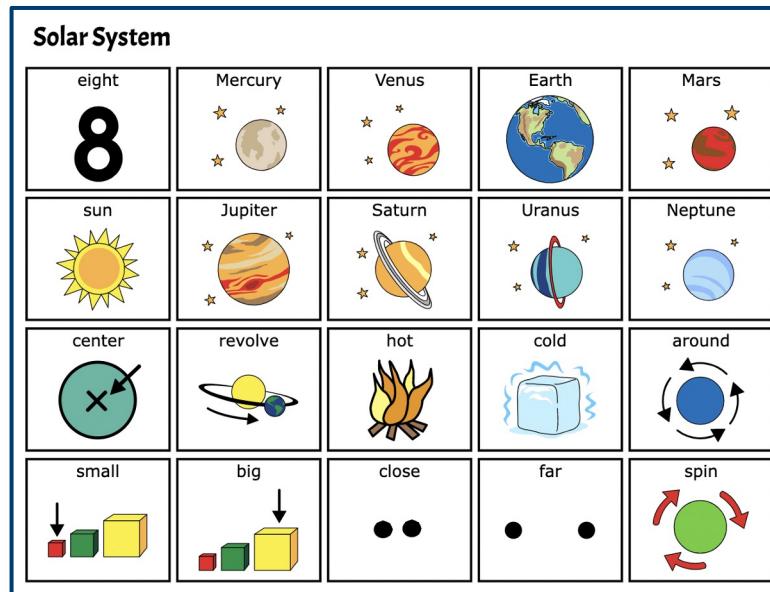


S-5 5 Recognize and compare objects in the solar system and their features...

...comparing simple physical characteristics (e.g., size, shape) of objects in the solar system

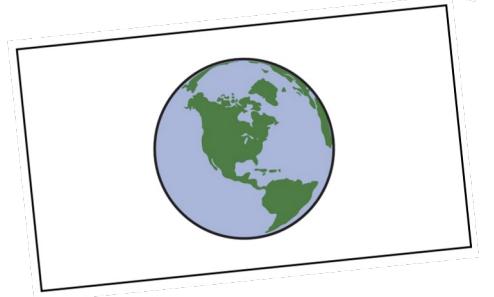
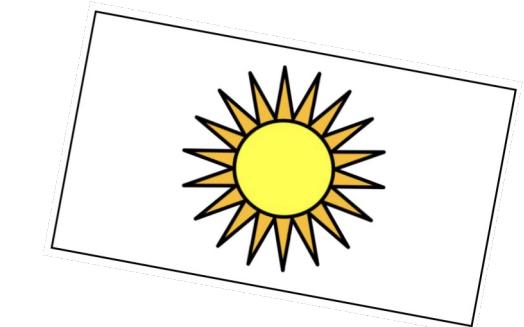
SAME MATERIALS SUPPORT Multiple VESOL

- Thematic visual supports and activities can be used for multiple VESOL instruction



MULTI-GRADE LEVEL PRACTICE AND REVIEW ACTIVITIES

- Matching word to picture activities provide VESOL independent practice and review across grade levels
 - Add Velcro to words and cardstock for file folder activities or use magnets on words and a cookie sheet



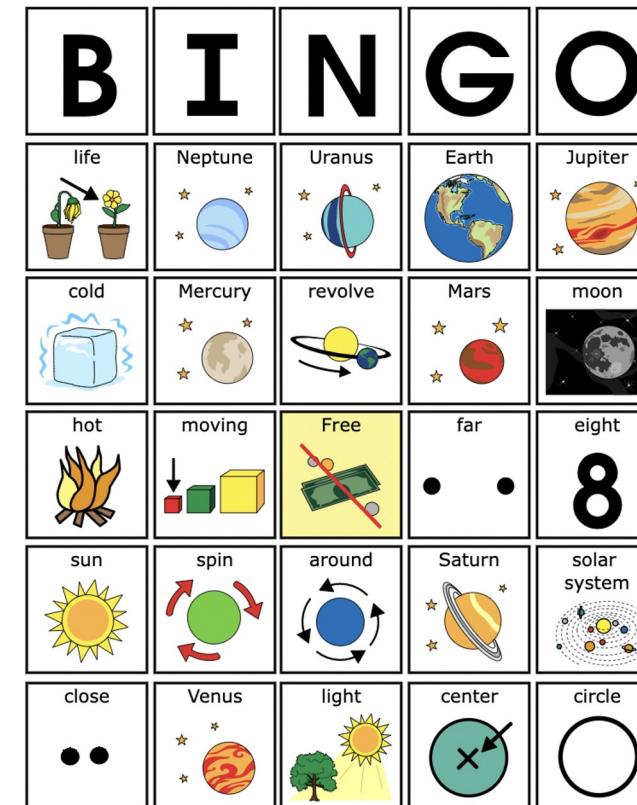
MULTIPLE GRADE AND INTEGRATED VESOL LEARNING ACTIVITIES

S-8 1 Recognize and compare objects in the solar system and their features

R-3 2, R-4 3, R-5 3, R-6 3, R-7 3, R-8 3, R-HS 3

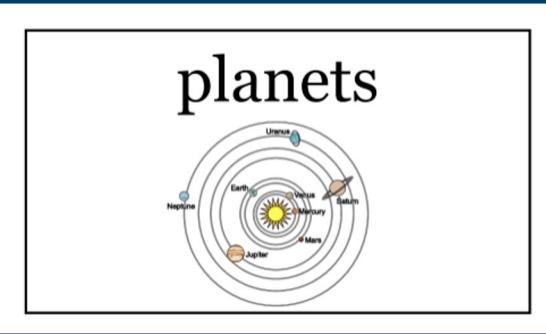
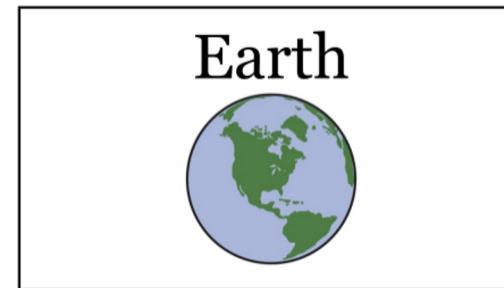
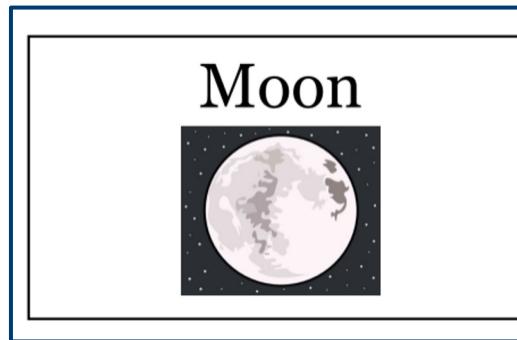
Answer questions about a nonfiction text that is read to the student or that the student reads.

Solar System BINGO



MULTIPLE GRADE FORMATIVE ASSESSMENT

- “What travels around the sun?”

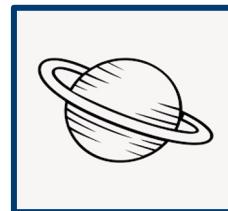
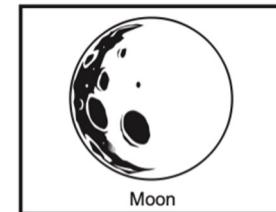
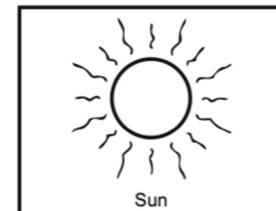
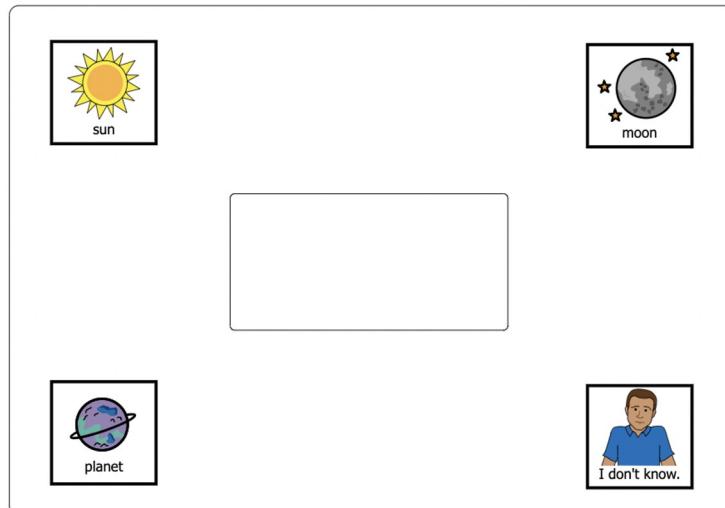


AT AND AAC ACROSS VESOL AND GRADES

R-HS 3: Answer questions about a **nonfiction text** that is read to the student or that the student reads

S-5 5 ...recognizing the sun and Earth as compared to other objects in the solar system

“What is in the center of the solar system?



ALIGNED MATHEMATICS AND SCIENCE VESOL SAME GRADE INSTRUCTION

Mathematics

M 5.15 The student will:

- Identify the geometric shape of a given object



Science

S-5 5, S-8 1 The student will:

- Recognize and compare objects in the solar system and their features

VESOL MATHEMATICS CONNECTIONS ACROSS GRADES

M-3 14

Use attributes of circles, triangles, and squares to identify shapes

M-4 20

Identify circles, triangles, squares, and rectangles.

M-6 11

Identify congruent shapes

M-7 8

Identify two dimensional shapes based on their characteristics.

PUTTING IT ALL TOGETHER: MAKING CONNECTIONS

- Select a theme topic
- Identify same and other grade level science VESOL connections
- Identify same and other grade level reading connections
- Identify same **and** other grade level mathematics connections
- Identify general education and inclusion connections
- Identify peer learning connections
- Identify community and daily routine connections
- Identify family connections

PUTTING IT ALL TOGETHER: PLANNING VESOL SCIENCE INSTRUCTION

- List VESOL that will be covered in the thematic unit
- List and acquire materials needed
 - literature
 - experiment materials
- List real world connections for increased student engagement
- List essential core and science vocabulary
- List AT and ACC needed to support instruction
- Determine how student knowledge will be assessed
- Plan hands-on learning activities and experiments
- Teach
- Assess
- Evaluate

TTAC ONLINE VESOL RESOURCES



Virginia Essentialized Standards of Learning (VESOL) Instructional Resources

Virginia Essentialized Standards of Learning (VESOL) Instructional Resources

The Virginia Essentialized Standards of Learning (VESOL) are Reading, Mathematics and Science Standards of Learning that are reduced in depth, breadth and complexity to make them relevant, accessible and appropriate for students with significant cognitive disabilities. The VESOL replace the retired Aligned Standards of Learning (ASOL) for Reading, Mathematics and Science beginning in the 2021-22 school year.

VESOL Educator Videos New

Recorded educator interviews provide tips and strategies for providing VESOL instruction:

- Where Do I Start?
 - Educators describe their experience with beginning VESOL instruction, including the development of VESOL scope and sequence and pacing guides and collaboration with general educators.
 - VESOL & the Unique Curriculum [\[PDF\]](#)
 - Preparing Students for the New VAAP [\[PDF\]](#)
 - How One Teacher Got Started with the VESOL Standards [\[PDF\]](#)
 - VESOL/SOL Alignment and General Educator Collaboration [\[PDF\]](#)

VESOL Instructional Resources

Resource compilations link educators to evidence-based practices and web-based instructional resources for students with significant cognitive disabilities:

- Evidence-Based Practices for Students with Significant Cognitive Disabilities Across All Content Domains
 - [PDF - ADA Compliant Version](#) [\[PDF\]](#) or [Word - ADA Compliant Version](#) [\[DOC\]](#)
- VESOL Literacy Instruction Resources
 - [PDF - ADA Compliant Version](#) [\[PDF\]](#) or [Word - ADA Compliant Version](#) [\[DOC\]](#)
- VESOL Mathematics Instruction Resources
 - [PDF - ADA Compliant Version](#) [\[PDF\]](#) or [Word - ADA Compliant Version](#) [\[DOC\]](#)
- VESOL Science Instruction Resources
 - [PDF - ADA Compliant Version](#) [\[PDF\]](#) or [Word - ADA Compliant Version](#) [\[DOC\]](#)
- VESOL AAC and AT Resources
 - [PDF - ADA Compliant Version](#) [\[PDF\]](#) or [Word - ADA Compliant Version](#) [\[DOC\]](#)

VESOL SCIENCE INSTRUCTION RESOURCES

Teachers providing VESOL science instruction should consult the Virginia Department of Education (VDOE) [Science Standards of Learning](#), [Science Instruction Resources](#), and [Virginia Learns](#) for up-to-date science instruction resources.

Links for visual and media supports include:

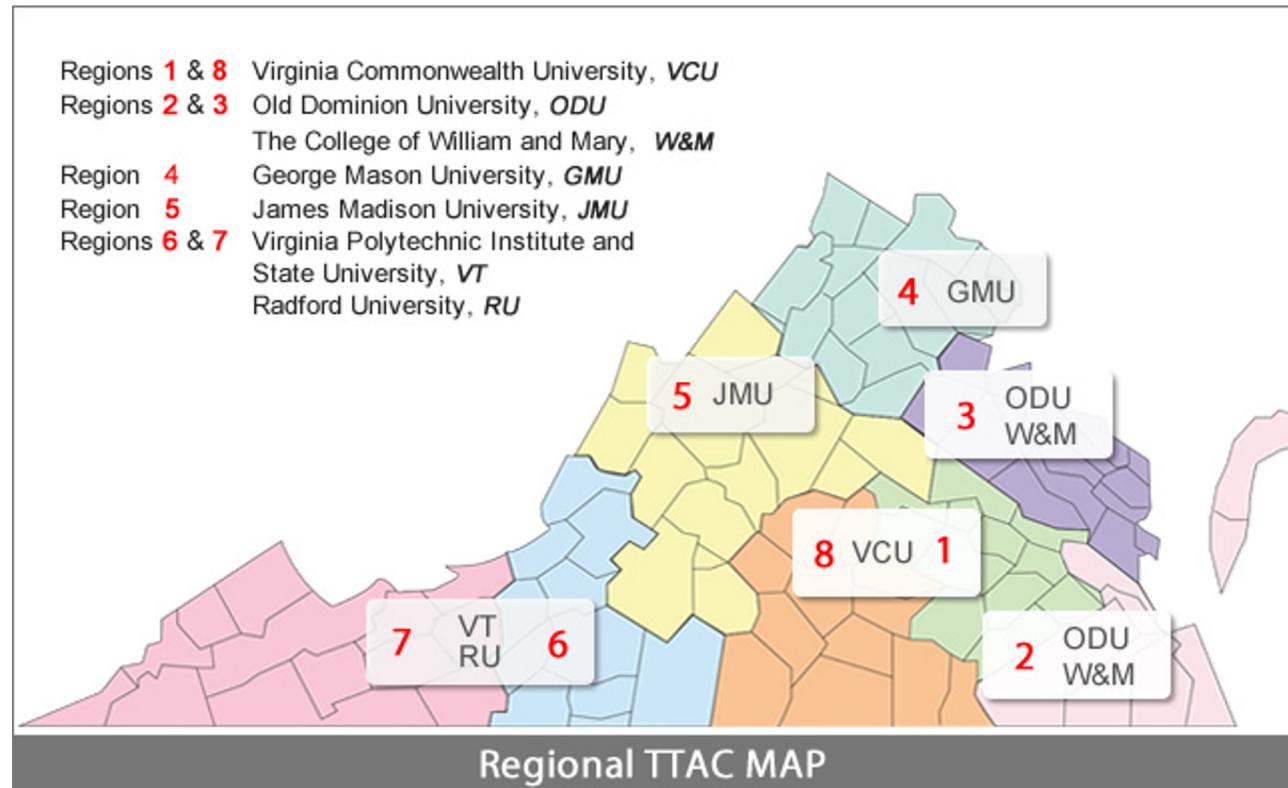
- National Science Foundation
- PBS Learning Media
- Smithsonian Teaching Resources
- Mystery Science
- Science News for Students
- National Geographic...

Virginia Essentialized Standards of Learning (VESOL) Instruction Resource	
Virginia Essentialized Standards of Learning (VESOL) Science Instruction Resource	
Teachers providing VESOL science instruction should consult the Virginia Department of Education (VDOE) Science Standards of Learning , Science Instruction Resources , and Virginia Learns or up-to-date science instruction resources.	
In addition, resources found on these websites may be used to enhance VESOL science instruction:	
National Science Foundation	A diverse collection of lessons and web resources, arranged by science content area, for classroom teachers, K-12 students, and their families.
PBS Learning Media	Public Broadcasting Learning media collection of videos, lesson plans, and interactive tools filtered by grade level for earth and space science, life science, physical science, practices and nature of science and instrumentation, measurement and units
Smithsonian Teaching Resources	Smithsonian searchable site for hands-on activities, posters, handouts, science literacy resources and featured collections for multiple science topics across all grade levels
Mystery Science	Grades K-5 lesson plans and activities aligned with Common Core and Next Generation Science standards
Newsela	Newsea sample science lessons and curriculum complements available for free; paid subscription required to access full site
Science News for Students	Science News for Students free resources to help students learn about science, including stories about recent research and current events in STEM fields
National Geographic	Educational resource library, searchable by topic and grade level K-12, for articles, activities, infographics, lessons, pictures, or videos for geography, earth science biology and chemistry
American Chemical Society	American Chemical Society resources, articles, and videos for a variety of chemistry topics
Data Nuggets	Data Nuggets collection of activities that bring real scientific data into the classroom and resource collection for other science curriculum enhancements
Teach Chemistry	American Association of Chemistry Teachers free resources for teachers including activities, animations, projects, simulations and videos for K-12

June 2021

REGIONAL TTACs

Contact your local TTAC for further resources and support



Frequently Asked Questions

FAQ 1:

Where can I find meaningful pictures and symbols to represent VESOL science vocabulary?

- [VDOE Science Instruction Resources](#)
- [TTAC Online VESOL Science Instruction Resources](#)
- [VDOE Virginia Learns-Science Resources](#)
- [STEM for ALL Resources](#)
- [Project CORE](#)

FAQ 2:

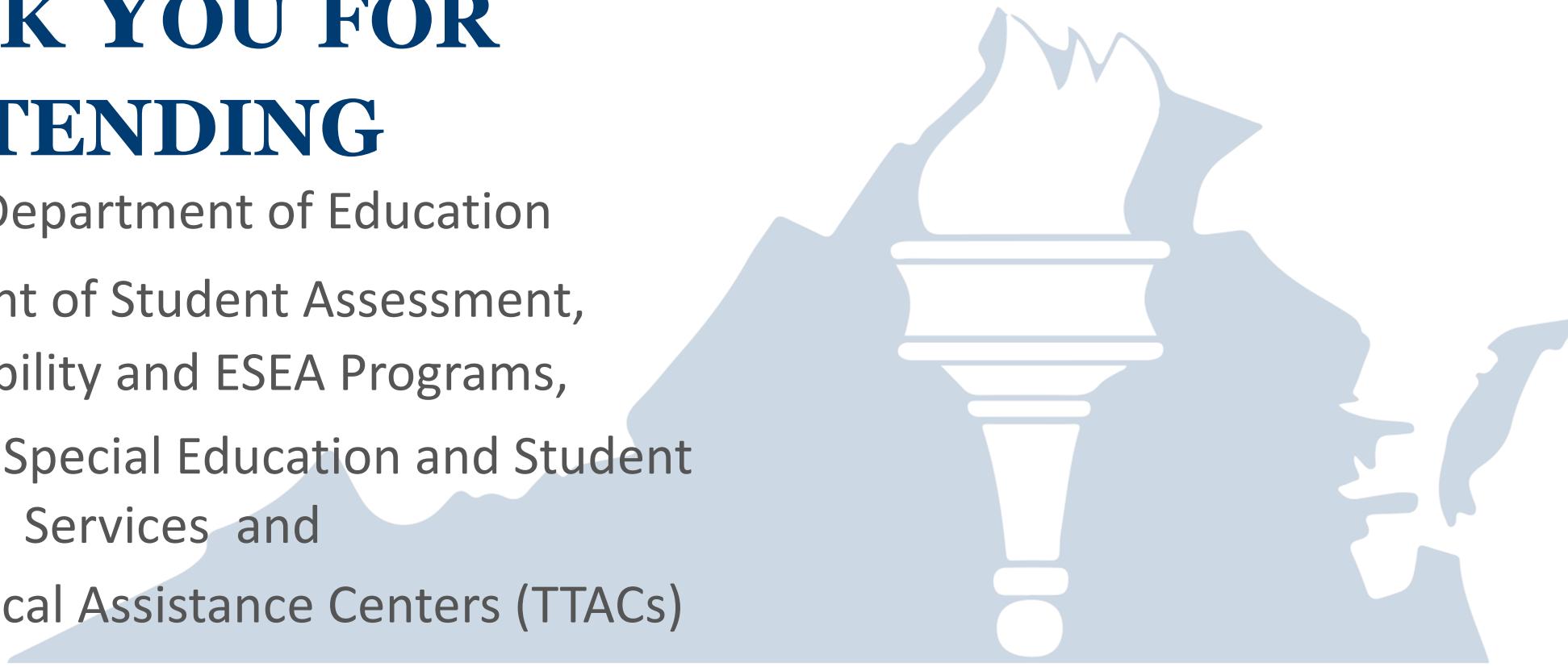
What strategies support student retention of VESOL taught earlier in the school year?

- Meaningful and relevant instruction connecting multiple VESOL
- Thematic instruction
- Increased opportunities to respond
- Vertical articulation and spiraled instruction across grades
- Peer and family engagement

THANK YOU FOR ATTENDING

Virginia Department of Education
Department of Student Assessment,
Accountability and ESEA Programs,
Department of Special Education and Student
Services and
Training Technical Assistance Centers (TTACs)

VIRGINIA DEPARTMENT OF EDUCATION



REFERENCES

- Browder, D. M., Trela, K., Courtade, G. R., Jimenez, B. A., Knight. V., & Flowers, C. (2010, April 7). Teaching mathematics and science standards to students with moderate and severe developmental disabilities. *The Journal of Special Education*.
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