



STEM in World Language Education

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Outcomes of This Session

Participants will:

- Become familiar with the Maryland Race to the Top World Language Pipeline Project, especially the STEM-focused WL curricular modules for elementary students
- Learn the process necessary for the creation of STEM-focused curricular modules for elementary students
- Develop strategies for adapting the Maryland curriculum or creating their own STEM-focused curricular modules



Maryland's Race to the Top Initiatives

In 2010, Maryland was the only state to receive federal *Race to the Top* funding to support world languages.

Maryland WL Pipeline Project

2010-2014

Elementary Programs for Arabic, Chinese, and Spanish:

- **Programs:** Funds for start-up costs and innovative technology
- **Curricular Modules:** STEM-focused WL curriculum modules
- **Teacher Development:** Online courses for WL teachers to teach elementary students
- **Student Assessment:** MD online LinguaFolio, Jr.

RTTT World Language Grants



- 2010-2011: Planning
- 2011-2012: 4 programs in 4 counties
- 2012-2013: 4 programs in 3 counties
- 2013-2014: 4 programs in 4 counties

A total of \$420,000 was awarded to 19 schools.

STEM–focused WL Modules: *The Process*

- Contract national experts and Maryland WL teachers
- Conduct curriculum workshops
- Write → Review → Revise
- Develop an ESOL module in English ; convert it into Arabic, Chinese, and Spanish
- Post online
- Review user feedback

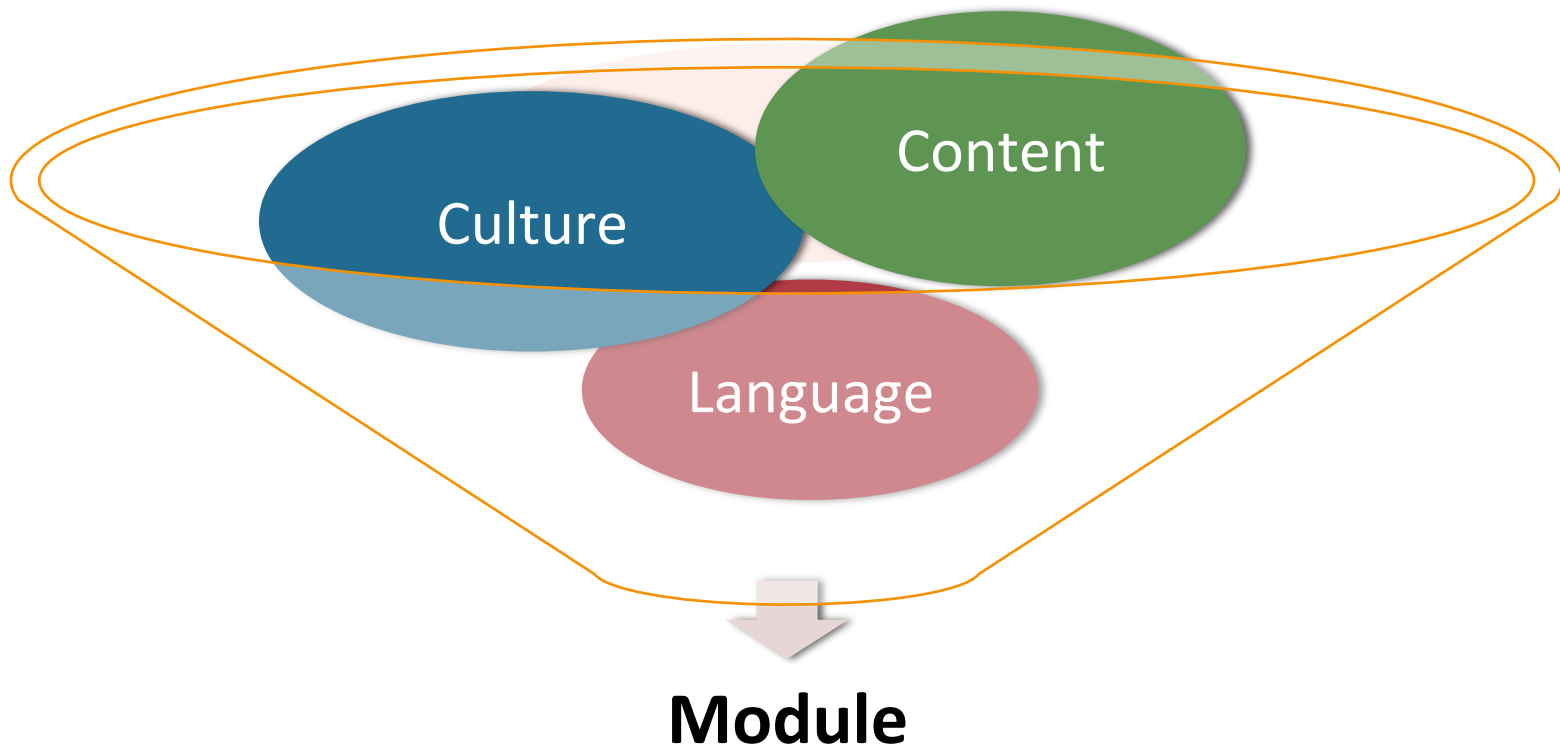
Standards-based

- National Standards for Foreign Language Learning
- Maryland Common Core State Standards
- Next Generation Science Standards



STEM-focused WL Modules: *Essential Elements*

- Priorities: language development, cultural experiences, and hands-on content reinforcement



Guiding Principles

- Story Form
- Performance-based assessment and instruction
- Understanding by Design/backward mapping
- Each module as an inquiry project, integrating 5Cs with 5Es



The 5Es Inquiry Model

ENGAGEMENT

Object, event, or question is used to engage students & make connections between what students know and can do.

EXPLORATION

- Objects and phenomena are explored.
- Hands-on activities, with guidance

EXPLANATION

- Students explain their understanding of concepts and processes.
- New concepts and skills are formulated.

EVALUATION

- Students assess their knowledge, skills, and abilities.
- Activities permit evaluation of student development and lesson effectiveness.

Activities allow students to apply concepts in contexts and build on or extend understanding and skill.

ELABORATION

*Standards for Foreign Language Learning in the 21st
Century ACTFL Performance Guidelines for K-12 Learners*

5Cs –

Communication

Cultures

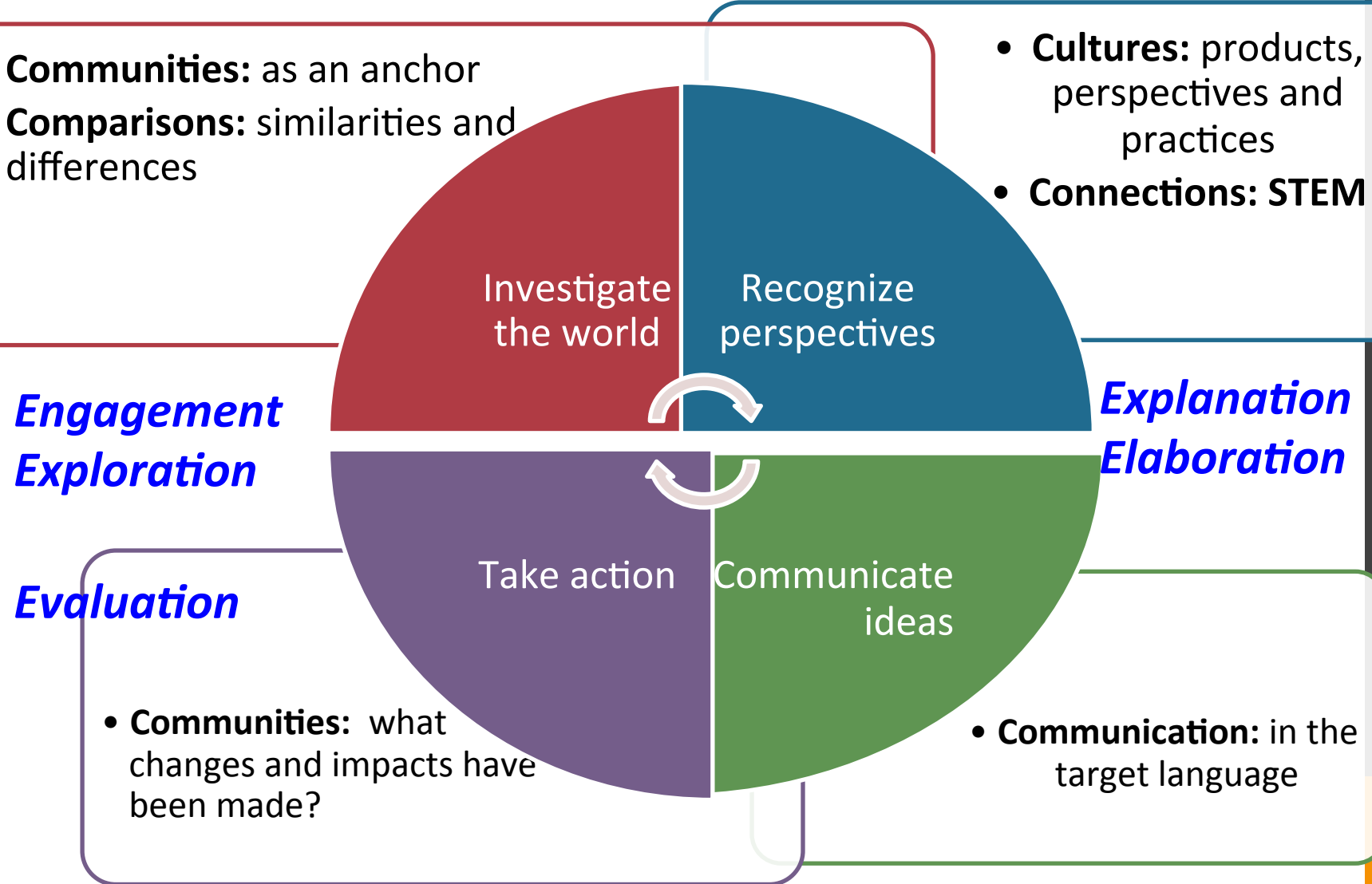
Connections

Communities

Comparisons



5 Cs-5Es in Global Competency Matrix



Teaching a World Language in the 5E Process

STEM 5E	Second Language acquisition	Student WL learning	WL instruction
Stages	Process	Process	Process
Engagement	Input	Teaser/ Activation	Beginning
Exploration	Input-intake	Learning via exploration & practice	Beginning/ Middle
Explanation	Intake-output	Demo understanding	Middle
Elaboration	Output	Application/ transfer	Middle/ Synthesis/creation
Evaluation	Output- assessment	Evaluation/Performance Assessment/reflection	Wow-Ending/ Teacher reflection

Time Needed for a Module and a Lesson

➤ **Time Needed:**

Implementation varies widely depending on the program type and design.

➤ **Each Module:** 5 lessons; roughly 25-35 days (or 5 weeks) to teach a module, including performance assessment.

➤ **Each Lesson:** about 30 to 45 minutes per day; roughly 5 days (or a week) to teach a lesson, including assessment.

Instructional Flow: Integrating 5Es and 5Cs + STEM

5Es	Module/ Lessons	5Cs + STEM
<i>Engagement</i>	Lesson 1/ Day 1	
<i>Exploration</i>	Lesson 2/ Day 2	
<i>Explanation</i>	Lesson 3/ Day 3	
<i>Elaboration</i>	Lesson 4/ Day 4	
<i>Evaluation</i>	Lesson 5/ Day 5	

Components of Maryland Modules

- Module with teacher guide
- Worksheet
- PPT slides (in most modules)
- Additional stories and other resources
- In ESOL, Arabic, Chinese, and Spanish

A statewide online Linguafolio, Jr. was also built

Grades K-1 Modules



Rainforest Friends



Different Phases of the Moon



Let's Go!



Change Can Be Good



*Sound:
Good Vibrations*



Your House and Mine

From Seeds to Table



Grades 2-3 Modules



What's the Matter with Ice Cream?



Water, Water Everywhere



Pyramids Around the World

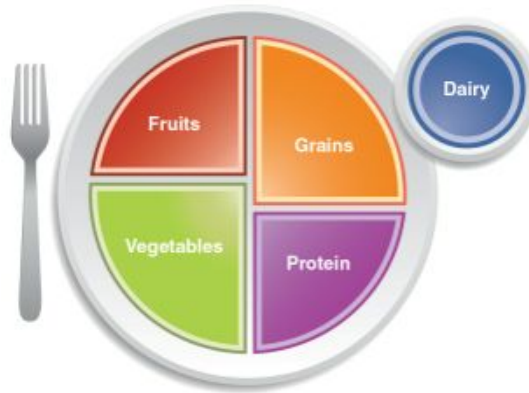
Grades 4-5 Modules

Natural Hazards



Bridges Around the World

Healthy Living



The Chesapeake Bay – A Home for Many



A Small Island with Big Idea – Hold on to Your Hat

Module Template

World Language-STEM MODULE COVERSHEET Module Name/Theme in English

Target Language:	Grade Level: 4 and 5
Proficiency Level: Junior Novice Low – Junior Novice Mid	
Context and Storyline:	
Enduring Understanding:	
Essential Questions:	
Module Duration and Lessons:	

Standards Targeted

SC – World Language Standards	SE – NGSS and STEM Standards
Communication Culture Connections (sample below) Comparison Community	Earth/Space Science 2.E.1 Describe observable changes in water. Skills and Process Technology Mathematics

Knowledge: Students will know...	Skills: Students can...
Vocabulary (both linguistic and content areas) Expressions and patterns	(Can do statement)

Performance Assessment

Interpretive Task
Presentational Task
Interpersonal Task
Materials/Resources

STEM Background for teachers: (Identified and provided by a STEM teacher/resource person)

World Language-STEM MODULE COVERSHEET Module Name/Theme in English

Lesson 1-Title in English Title in the FL

Lesson: 1 of 5	Duration: 30 Minutes
Objectives	ICan: Oral language: Literacy: STEM and Other Subject Areas:
Vocabulary and Expressions	Previously learned (Only in Lesson 1) Content obligatory language Content compatible language
Materials/Resources	☐ —
Lesson Storyline and Core Text	

Key Elements	Lesson 1 Procedures
Engagement	<ul style="list-style-type: none"> Object, event or question used to engage students. Connections facilitated between what students know and can do
Exploration	<ul style="list-style-type: none"> Objects and phenomena are explored. Hands-on activities, with guidance.
Explanation	<ul style="list-style-type: none"> Students explain their understanding of concepts and processes. New concepts and skills are introduced as conceptual clarity and cohesion are sought.
Elaboration	Activities allow students to apply concepts in contexts, and build on or extend understanding and skill.
Evaluation	Students assess their knowledge, skills and abilities. Activities permit evaluation of student development and lesson effectiveness.

Teacher Reflection Lesson 1- [Lesson 1 title]

What worked well?	
What did not work well?	
What would I do differently?	

Cover Sheet

Target Language: English as a Second Language		Grade Level: 4 and 5	
Proficiency Level: Junior Novice Low – Junior Novice Mid			
Context and Storyline: The Bridge Engineering Security Team has sent the class a package about a mission to design "A Bridge for the Future" for cities devastated by a major disaster. The team must explore bridges that are located around the world that have been classified as great structures of the world. As they travel around the world to explore these bridges, the class will learn about the engineering design, type, and history for each bridge. Students will become members of the Bridge Engineering Security Team by designing and constructing a "Bridge for the Future."			
Enduring Understanding: The design of bridges has greatly changed throughout history due to a variety of factors.			
Essential Questions: <ul style="list-style-type: none"> • 桥的种类、造型、及桥对人类的用处。 • 桥的故事。 			
Module Duration and Lessons: The module is designed for three to five 30-minute class periods per week over three to five weeks. Instructional time will depend on students' previous knowledge of content and vocabulary, as well as their language proficiency. Other factors include program type and whether the module is used as the main core of instruction or as a supplementary resource. Lesson 1: 盖桥 Lesson 2: 桥桥 Lesson 3: 吊桥 Lesson 4: 未来的桥梁 Lesson 5: 评估			
Standards Targeted			
SCs – World Languages Standards		NGSS/STEM Standards	
Communication <ul style="list-style-type: none"> • Students engage in brief exchanges about personal interests in the target language. (1.1.A) • Students understand spoken and written language on very familiar topics in the target language that promote the learning of basic linguistic structures. (1.2.A) • Students make short presentations and write simple communications on very familiar topics in the target language. (1.3.A) Cultures Students identify and describe the products within the cultures studied. (2.1.A)		NGSS <ul style="list-style-type: none"> • (E-5-ETS 1-1) Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. • (3-5-ETS 1-2) Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. • (3-5-ETS1-3) Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved. 	
Connections Students access new information and reinforce		STEM Engineering	

我们的梁桥



TEAM MEMBERS: _____

1. 把书分成左右两堆，距离四英寸。 2. 将一个卡片（桥）放在两堆书的中间。假设：我们的桥可以载_____分纸。

实验：



1. 每一次放一分纸，直到桥梁坍塌，算算共用了几分纸。

2. 记录结果。

分析结果：

1. 在你的团队，讨论为什么桥塌了。

2. 讨论如何使桥更强，使得它可以支持更多的负载（便士）。

3. 测试你重建桥梁。

	桥墩之间的距离	桥墩的高度	桥的厚度	负载量
实验#1				
实验#2				
实验#3				
实验#4				
实验#5				
实验#6				

CONCLUSION:

PowerPoint Slides Provide Visuals, Content, and Communication

这两座桥有什么不同？



小鸭子的故事



Story Books

小种子找到了它的家



有一个小的种子，从一棵大树上掉
下来。小种子说：“我能去哪里呢？
哪里是我家？”



大风来了，小种子飞在空中。飞呀飞，
小种子在空中飞呀飞。小种子说：
“我能去哪里？哪里是我家？”

LinguaFolio, Jr. – An online assessment portfolio



The screenshot shows the homepage of the LinguaFolio Online website. At the top left is the Maryland State Department of Education logo with the tagline "Preparing World-Class Students". On the top right are links for "Help" and "Sign In". Below the logo are "Home" and "About" navigation buttons. The main content area features a photograph of a woman and a young girl reading together at a table in a library. To the right of the photo is a "Welcome to LinguaFolio Online!" section with a brief description and a link for registration help. Further right is a "Sign In" form with fields for "User Name" and "Password", a "Stay Signed In" checkbox, a "Login" button, and a "Lost Password" link. Below the sign-in form is a "Not a Member Yet?" section with a "Sign Up Now" link. At the bottom center, there is a copyright notice: "Copyright © 2013 University of Oregon CASLS".

MARYLAND STATE DEPARTMENT OF EDUCATION
Preparing World-Class Students

Help | Sign In

Home | About

Welcome to LinguaFolio Online!
LinguaFolio Online: Prove Yourself to the World
LinguaFolio Online shows the world what you can do with language. Build your case for becoming a citizen of the world here!
Need help with Registration? [Read This](#)

Related Resources:

- [NCSLP](#)
- [STARTALK](#)
- [LinguaFolio Online Self-Assessment Grid](#)

Sign In

User Name:

Password:

Stay Signed In:

Login

[Lost Password](#)

Not a Member Yet?
Start building your language portfolio today! [Sign Up Now](#)

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Feedback/Issue?

Maryland LinguaFolio, Jr. – Can Do Statements

? EDIT AFONSE4439'S CAN DO FOR: *Chinese (Mandarin), Novice Low, Speaking, [Course]*

How well Can you Do the skills below? Select a status on the right.

[Back to the Student List](#)

Can Do Statement	Reset	 I'm still learning	 I can do it with help	 I can do it	Evidence
I can repeat words I hear.	Reset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
I can say hello and goodbye to people.	Reset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0
I can name some people, places, or objects.	Reset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1
I can answer simple questions in a single word.	Reset	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	0

LinguaFolio, Jr. – Upload Evidence

? AFONSE4439'S EVIDENCE FOR CAN DO: *Chinese (Mandarin), Novice Low, Speaking.*

CanDo: *I can repeat words I hear.*

Status: *I can do it*

[Back to afonse4439's CanDo](#)

A grid of six buttons for uploading evidence:

- Writing Sample (blue button with pencil icon)
- Web 2.0 Evidence (light blue button with document icon)
- MP3 Sound (green button with headphones icon)
- Speech Recording (orange button with microphone icon)
- Picture File (red button with image icon)
- PDF Document (black button with document icon)

Date & Time	Title	Evidence List	Edit
05/26/13 08:52 PM	afonse.sp1		

MD LinguaFolio, Jr. – Student Passport

Feedback/Issue?



- + Languages I have learned in my family
- + Languages I have learned in school
- + Languages I learned outside of normal school instruction
- + Language experiences (travel with my family)
- + Language tests, competitions, certificates, diplomas

Language: Chinese (Mandarin)

	Novice Low	Novice Mid	Novice High
Speaking	[Progress bar]		
Listening	[Progress bar]		
Reading	[Progress bar]		
Writing	[Progress bar]		

Language: Chinese (Mandarin)

	Novice Low	Novice Mid	Novice High
Speaking	[Progress bar]		
Listening	[Progress bar]		
Reading	[Progress bar]		
Writing	[Progress bar]		

Language: Arabic

	Novice Low	Novice Mid	Novice High
Speaking			
Listening			
Reading			
Writing			

Not Started: In Progress: Complete:

Novice Low

I can repeat words I hear.

I'm still learning	I Can Do it! With Help	I Can Do it!	Not Checked
5%	7%	71%	17%

MD LinguaFolio, Jr. – Data Summary

Novice Mid

I can introduce myself.

I'm still learning	I Can Do it! With Help	I Can Do it!	Not Checked
10%	2%	1%	87%

I can ask and answer simple memorized questions.

5%	6%	1%	88%
----	----	----	-----

I can recite simple rhymes or sing songs with others.

0%	14%	18%	68%
----	-----	-----	-----

Novice High

I can express likes and dislikes.

I'm still learning	I Can Do it! With Help	I Can Do it!	Not Checked
10%	0%	1%	89%

I can describe myself, family, and things.

10%	0%	1%	89%
-----	----	----	-----

I can ask and answer questions in simple sentences.

10%	0%	1%	89%
-----	----	----	-----

I can ask for help when I need it.

10%	0%	1%	89%
-----	----	----	-----

I can recite simple rhymes or sing songs by myself.

10%	0%	3%	87%
-----	----	----	-----

Find these Modules Here

The screenshot shows the Maryland State Department of Education website. At the top, the logo for the state of Maryland is on the left, followed by the text "MARYLAND STATE DEPARTMENT OF EDUCATION". To the right is a search bar and links for "Home", "About Us", "Contact Us", and "Feedback". Below the header is a navigation bar with tabs for "ACCOUNTABILITY", "PARENTS", "PROGRAMS", "STATE BOARD", "STUDENTS", and "TEACHERS/PRINCIPALS". A "Divisions" dropdown menu is open, showing "Curriculum, Assessment & Accountability" selected, with "World Languages Elementary STEM Curriculum Modules" listed below it. Other options in the dropdown include "Assessment & Accountability", "Career, Technical & Adult Education", "Early Childhood", "Elementary", "English Language Learners", "High School", "Special Education", and "Technology".

On the left side, there is a portrait of Dr. Lillian M. Lowery, Superintendent of Schools, with her name and title below it. Below this is a vertical menu with categories: "ABOUT MSDE" (Overview), "DIVISIONS/OFFICES" (Divisions/Offices), "PROGRAMS" (Programs), "STATE BOARD" (State Board), "NEWS ROOM" (News Room), "SCHOOL SYSTEMS" (Open and Closing Dates, System Links, System Superintendents), and "TESTING" (Testing Content and Data, Alt MSA).

The main content area features a large banner for "Maryland's College and Career Ready Standards" (developed from the Common Core State Standards). The banner includes the text "Resources for Educators, Parents and the Public. Preparing Our Graduates for the World that Awaits Them" and an image of a diverse group of students. To the right of the banner is a small photo of President Obama and Vice President Biden.

Below the banner, there are several sections:

- Also of Interest:** A link to "Maryland Special Education Parent Involvement Survey" with a "Watch More" button. The survey dates are "April 7th to May 30th 2014".
- Maryland Makes It Eight Years In A Row As Number One In Advanced Placement Success in 2014:** A link to a video message from Maryland Public Television (MPT) Common Core Standards Video Messages. The video features a woman in a lab coat and the text "CAREER AND COLLEGE".
- Your Latest Information:** A list of recent news items:
 - Maryland State Board of Education to Meet on Tuesday, April 22 (April 21, 2014)
 - Notice of Public Hearing: Mayor and City Council of Baltimore City/ Baltimore City Public Schools Agree On FY 2015 Maintenance of Effort Waiver Request (April 16, 2014)
 - PUBLIC NOTICE AND COMMENT: Comment period opens for a one year waiver of section 421(b) of the

On the right side, there are several informational boxes:

- PARCC:** Information about PARCC Assessments and PARCC MPT Videos (30- and 60- second vignettes).
- Regulations:** Links to Emergency Regulations, Proposed Regulations, Regulatory Review, and Public Announcement - Stakeholder Review Committee Meeting.
- Connect With MSDE:** Social media icons for Facebook, YouTube, and Education Bulletin.
- MSDE Blackboard Learn:** A logo for Blackboard Learn.
- News Updates:** A list of recent news items:
 - Maryland Education Bulletin
 - Maryland STEM Programs
 - MSDE Emergency Planning Guidelines
 - Race to the Top Monthly Update
 - Report of the Traumatic Brain Injury/Sports-Related

Questions or Comments?

- *How are these modules different from traditional curricular units?*
- *How can you adapt a module for your program or classroom?*
- *Other thoughts and suggestions?*

Thank you! 谢谢!

Visit MSDE WL/STEM Modules at

<http://bit.ly/1guiNcv>

Contact us:

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