Reporting Scores from NGSS Assessments: Exploring Scores & Subscores

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Reidy Interactive Lecture Series

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Center for Assessment

Outline

Presentation	• Approaching NGSS Score Reporting • Subclaims • Example Subclaims	20 Minutes
Group Work	• Developing or Refining a Reporting Structure in Table Groups, based on Group Selected Context	30 Minutes
Report Out	• Share out & discuss potential reporting structures (proposed structure, with motivation and concerns about misinterpretation)	20 Minutes

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- Example Subclaims

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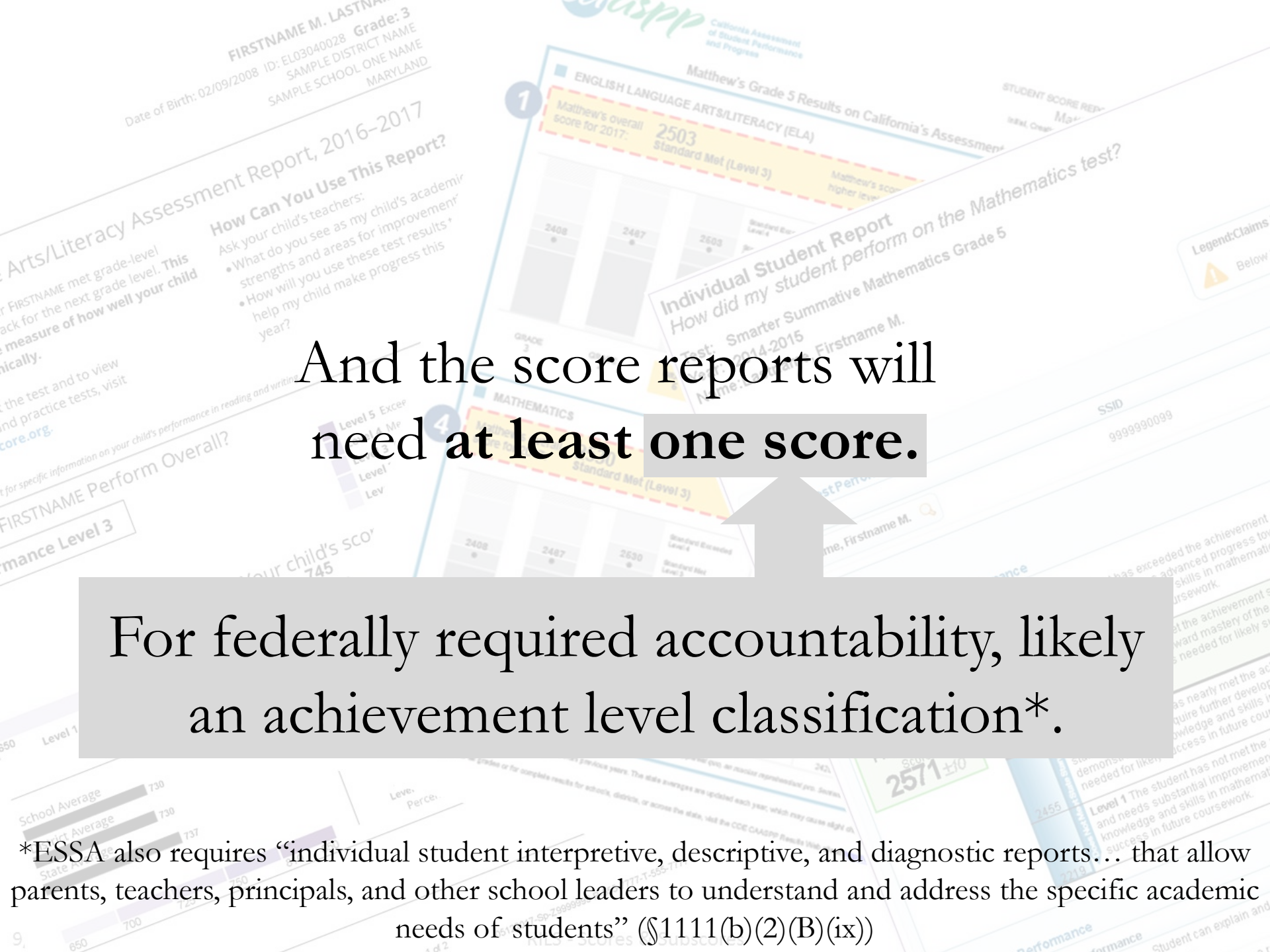
The NGSS stresses the **integrated** nature of science learning (i.e., "three dimensional science learning").

Informed by the integrated nature of the standards, large-scale assessments have sought to assess intersections of the three dimensions (often, PEs).

A looming question:

How should the results of these assessments be reported?



And the score reports will need **at least one score.**

For federally required accountability, likely an achievement level classification*.

*ESSA also requires "individual student interpretive, descriptive, and diagnostic reports… that allow parents, teachers, principals, and other school leaders to understand and address the specific academic needs of students" (§1111(b)(2)(B)(ix))

A Quick Aside on Score Reports

- Infamously "the last thing developed and the first thing seen" (c.f., Zenisky, Hambleton & Sireci, 2009)
  - Instead, **develop score reports** (reporting categories and mock ups) **through-out the development cycle**, starting in conjunction with the development of claims and blueprints, involving a **multidisciplinary team**

Initial Preparation	Report Development	Report Tryout and Revision	
• Defining report purpose • Carrying out needs assessment	• Developing prototype reports	• Field testing • Collecting data • Revising and redesigning (Repeat as needed)	• Ongoing maintenance
• Identifying intended audience			

(Zenisky & Hambleton, 2012)

Best Practices (Zenisky & Hambleton, 2012)

Development
- Tailored to stakeholder groups
- Field tested

Design
- Clean and simple layout
- Clear and concise language
- Graphs

Content
- Contain all needed information
- Be actionable
- Contain anchor points
- Align clearly and explicitly to standards
- Reported at the most fine-grain level possible
- Provide context for score scales

Ancillary materials
- Annotated example score report
- In-depth background materials
- Sample questions

Dissemination efforts
- Timely enough to be meaningful
- Menu-driven websites with on demand information
- Languages other than English as well as offline formats

Best Practices (Zenisky & Hambleton, 2012)

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- Tailored to stakeholder groups
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In short, tell a **compelling story** about a student's performance to a **particular audience** for a **particular use.**

Best Practices (Zenisky & Hambleton, 2012)

Development

1. Tailored to Stakeholders

Desi

- Clear and concise language
- Graphs

Contents

- Contain all needed information

2. Clearly Convey Standards

4. Provide Fine-Grain Information

Ancillary materials

- Annotated example score report
- In-depth background materials

3. Provide Sample Questions

demand information

- Languages other than English as well as offline formats

Focus areas for this presentation.

1. Defining Stakeholder groups

- Who are the audiences and how can we best communicate the NGSS to them? Often we have a
  - Student Report (for Students, Teachers & Parents)
    - For the NGSS Students & Parents may need a different report than Teachers
  - Classroom Report (For Teachers and Administrators)
  - School Report (For Administrators & Policy Makers)
  - District Reports (For Administrators & Policy Makers)

- Stakeholder groups are not exchangeable -

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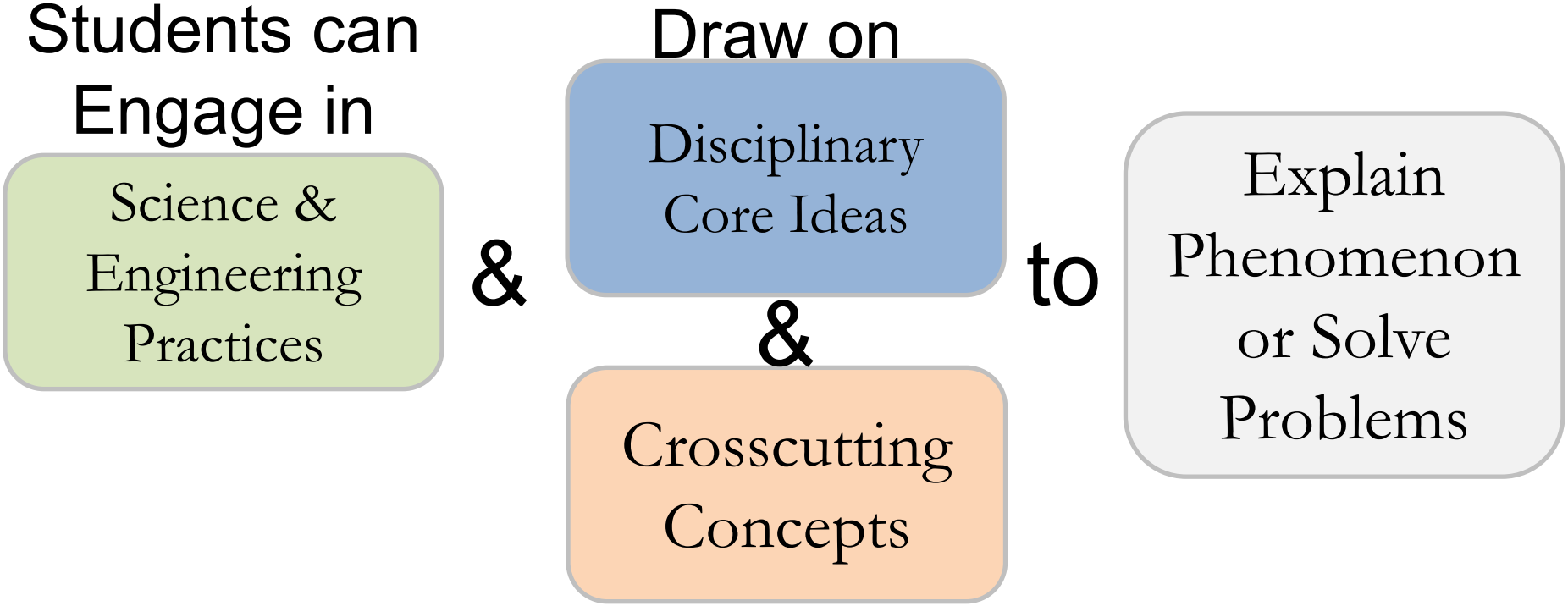
2. Clearly convey the standards

- Different than reporting performance on a task! Instead, we are trying to make an **overall claim** about student performance in relation to the standards.
- Likely, the claim is based on a selected (and limited) number of performance expectations.

2. Clearly convey the claim

- The claims we've seen thus far are often are in the form of:



2. Clearly convey the claim

- This type of claim is very general – can we support such a claim given a particular set of PEs?
  - Or should the overall claim be delimited, or even defined operationally?
  - For example, grade 5 is heavy on the *developing and using models* and *engaging in argument* SEPs. Should the claim be specific enough to reflect that?
- We suggest making the overall claim specific enough to inform test development, and then translate that claim for each audience (or perhaps, start at the subclaim level).

2. Translate the claim

- Rephrase the claim in ways that communicate to the intended audience.
- Develop user friendly text and graphics that go above and beyond statements of the "mastery of the standards".
  - A rough example might be "science learning involves not only knowing the *core ideas* of science, but also being able apply the *practices* scientists and engineers use to solve problems and draw on *concepts* that cut across the domains of science".
  - Clearly, the above text would need to be carefully explored to determine how to best communicate the standards for the given audience.

3. Sample questions

- Given the complexity of the standards, as well as the items and tasks, providing a sample question or questions that conveys the gist of the standards is likely to be more important for the NGSS than other standards.
- Particularly for assessments with rich tasks (e.g., those designed under the item clustering approach)
- Could these be part of the score reporting (e.g., on a second page)?

Misc. Student Info.

Clear and friendly text

Implications for a student report, this far.

Page 1

Page 2

Misc. Student Info.

Translated Claim

?

Page 1

Key parts of Sample Task, Crammed onto a Single page?

Page 2

Misc. Student Info.

Translated Claim

- Overall Score(s)
- Subscores
- Comparisons

Page 1

Key parts of Sample Task, Crammed onto a Single page?

Page 2

4. Fine-Grained Information

- How can we convey information at a finer grain than the overall score? E.g., about student strengths and weaknesses.
- Particularly difficult – are we trying to disintegrate the integrated NGSS? Maybe, but maybe not.
  - Need to tackle this tension, as subclaims can help provide clarity on issues of design, and
  - Subscores are often expected on score reports.

4. Subscores

- Subclaims & subscores have often been used synonymously, but we suggest that subclaims be developed to help guide development and reporting.
- Whether subclaims can be used to create subscores for the NGSS is an open question.
- Often, subscores are a "less reliable version of the total score".

4. Consumer Reports?

Top—and Bottom—of the Class

Analyzing our exclusive test and survey data across the car model lines allows us to rank the brands and provide valuable insights into how they compare on several key factors.

Rank	Brand	Overall Score	Road-Test Score	Predicted Reliability	Owner Satisfaction
1	Audi	81	86	^	^
2	Porsche	78	88	–	^^
3	BMW	77	86	–	^
4	Lexus	77	74	^^	^
5	Subaru	74	81	–	^
6	Kia	74	77	^	–

4. Approaching subscores

- We suggest that a subclaim encompassing all of a dimension is untenable (e.g., a claim about a student's ability to apply the set of SEPs)
- What will be "foregrounded" within the subclaims?
  - DCIs Domains?
  - SEPs and CCCs?
  - Phenomenon?
- Stringent item classifications to create better subscores?

Foregrounding DCI Domains

- The student understands physical systems as demonstrated through the application of the Science and Engineering practices and the Crosscutting Concepts.

- The student understands Earth and space systems as demonstrated through the application of the Science and Engineering practices and the Crosscutting Concepts.

- The student understands living systems as demonstrated through the application of the Science and Engineering practices and the Crosscutting Concepts.

Grade 5 Standards Matrix

		Science and Engineering Practices							
		Asking questions and defining problems	Developing and using models	Planning and carrying out investigations	Analyzing and interpreting data	Using mathematics…	Constructing explanations and designing solutions	Engaging in argument from evidence	Obtaining, evaluating, and communicating information
Crosscutting Concepts	Patterns				5-ESS1-2 (ESS1B.a)				
	Cause & Effect			5-PS1-4 (PS1B.a)				5-PS2-1 (PS2B.c)	
	Scale, proportion, & quantity		5-PS1-1 (PS1A.a)	5-PS1-3 (PS1A.c)		5-PS1-2 (PS1A.b, PS1B.a, PS1B.b) 5-ESS2-2 (ESS2C.a, ESS2C.b)		5-ESS1-1 (ESS1A.a)	
	Systems & system models		5-LS2-1 (LS2A.a, LS2A.b, LS2A.c, LS2A.D, LS2B.a) 5-ESS2-1 (ESS2A.b)						5-ESS3-1 (ESS3C.a, ETS1B.c)
	Energy & matter		5-PS3-1 (PS3D.b, LS1C.a)					5-LS1-1 (LS1C.b)	
	Structure & function								
	Stability & change								

Foregrounding SEPs & CCCs

Gathering Data and Investigating Scientific Questions:	Reason with Evidence and Evaluate Scientific Claims and Questions	Construct Scientific Explanations:	Making Connections:
The student is able to obtain information, ask questions or define problems, plan and carry out investigations, use models to gather data and information and/or use mathematics and computational thinking to gather evidence relevant to a scientific question or problem relating to the structure and properties of matter.	The student is able to evaluate information, analyze data, use mathematics and computational thinking, construct explanations, develop arguments from evidence and/or use models to predict and develop evidence to make sense of scientific phenomena specific to the structure and properties of matter.	The student is able to explain or develop an argument to support or refute another explanation of scientific phenomena relevant to the structure and properties of matter by arguing from evidence and/or using models to communicate information.	The Student is able to use crosscutting concepts to define the physical system being investigated, recognize changes in the system, and/or to find patterns to use as evidence to support explanations or arguments of how or why the phenomenon occurs.

Grade 5 Standards Matrix

Crosscutting Concepts	Science and Engineering Practices: Subclaim #1: Gathering Data & Investigating Scientific Questions — Asking questions and defining problems	Subclaim #1: Gathering Data & Investigating Scientific Questions — Planning and carrying out investigations	Subclaim #2: Reason with Evidence and Evaluate Scientific Claims and Questions — Analyzing and interpreting data	Subclaim #2: Reason with Evidence and Evaluate Scientific Claims and Questions — Using mathematics…	Subclaim #2: Reason with Evidence and Evaluate Scientific Claims and Questions — Engaging in argument from evidence	Subclaim #3 Construct Scientific Explanations — Developing and using models	Subclaim #3 Construct Scientific Explanations — Constructing explanations and designing solutions	Obtaining, evaluating, and communicating information
Patterns			5-ESS1-2 (ESS1B.a)					
Cause & Effect		5-PS1-4 (PS1B.a)			5-PS2-1 (PS2B.c)			
Scale, proportion, & quantity		5-PS1-3 (PS1A.c)		5-PS1-2 (PS1A.b, PS1B.a, PS1B.b); 5-ESS2-2 (ESS2C.a, ESS2C.b)				
Systems & system models						5-LS2-1 (LS2A.a, LS2A.b, LS2A.c, LS2A.D, LS2B.a); 5-ESS2-1 (ESS2A.b)		5-ESS3-1 (ESS3C.a, ETS1B.c)
Energy & matter					5-LS1-1 (LS1C.b)	5-PS3-1 (PS3D.b, LS1C.a)		
Structure & function								
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Subclaim 1 | Subclaim 2 | Subclaim 3

Grade 5 Standards Matrix

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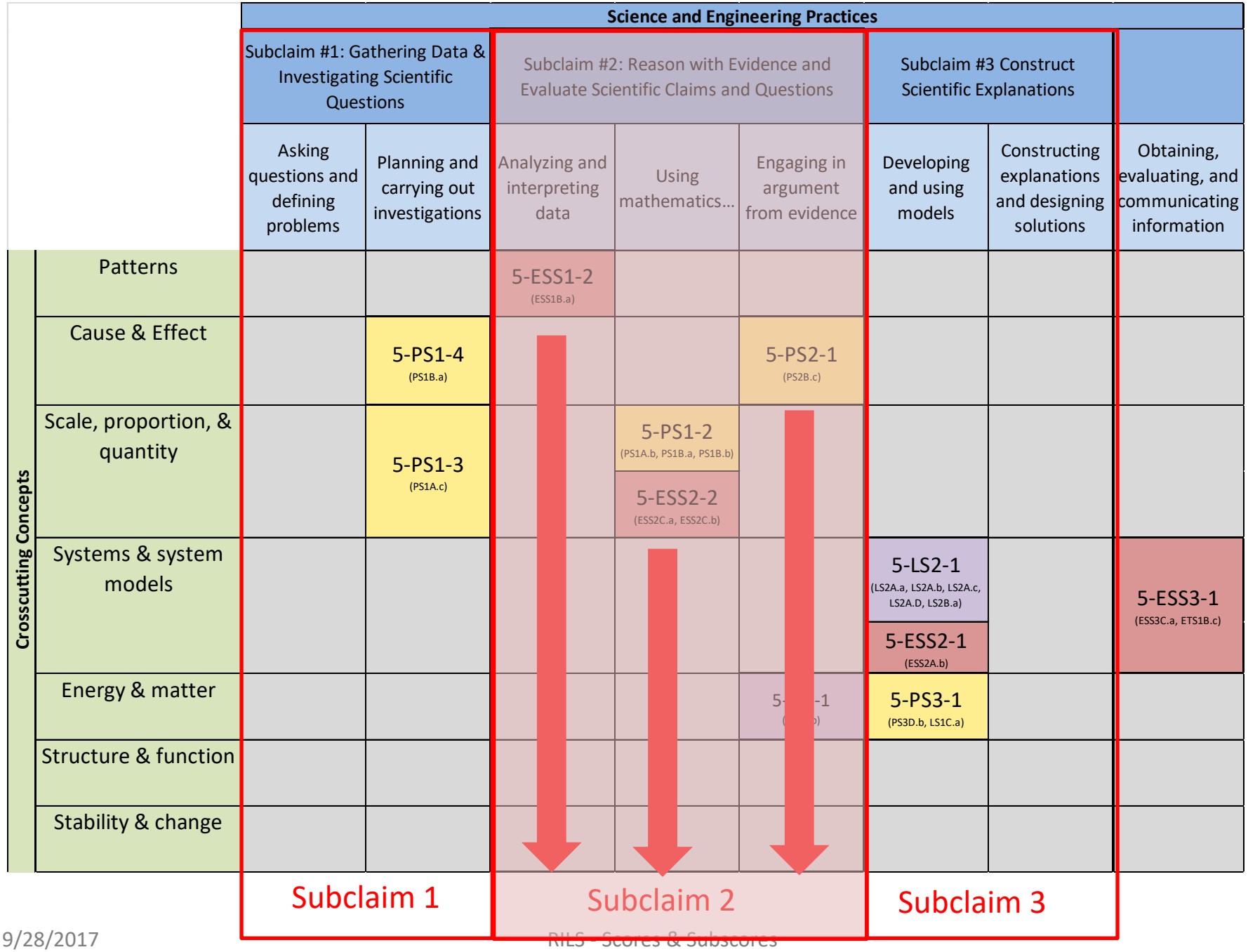

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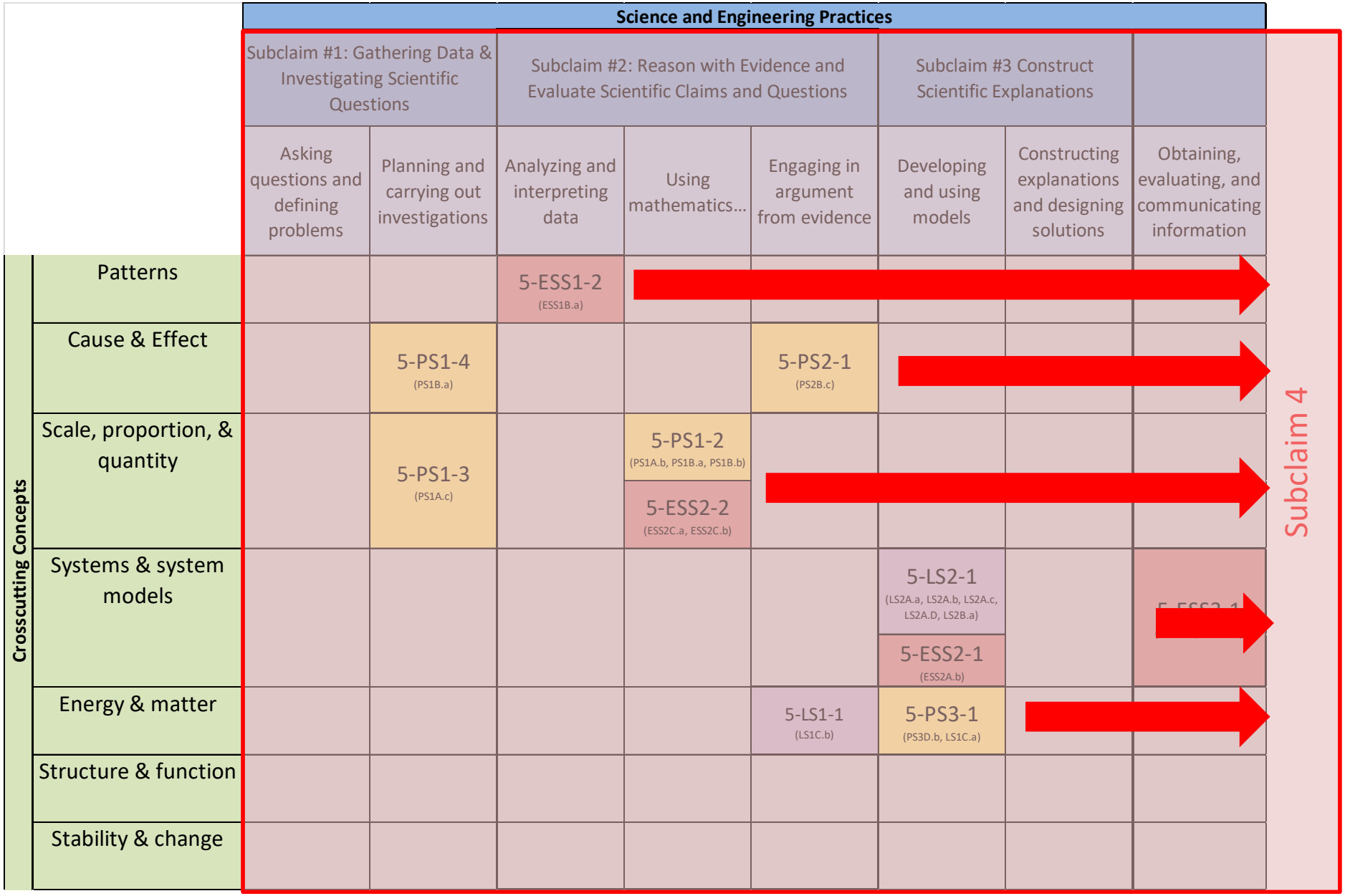

Foregrounding Phenomenon

- The student has explained the phenomenon of migration by describing the variations in available food using a model (5-PS3-1)
- …

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