Assessment Literacy for Teachers:
Connecting Curriculum, Instruction, and Student Learning

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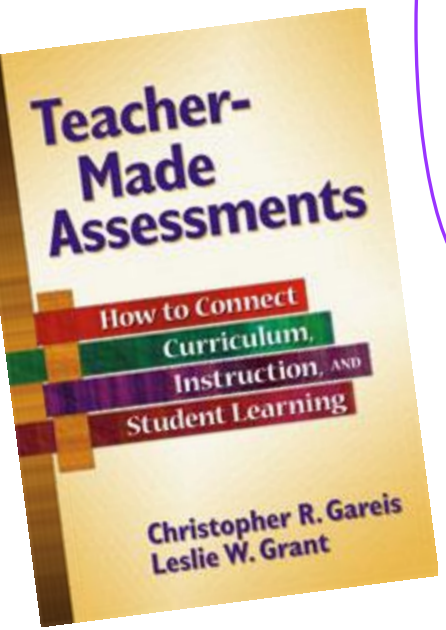
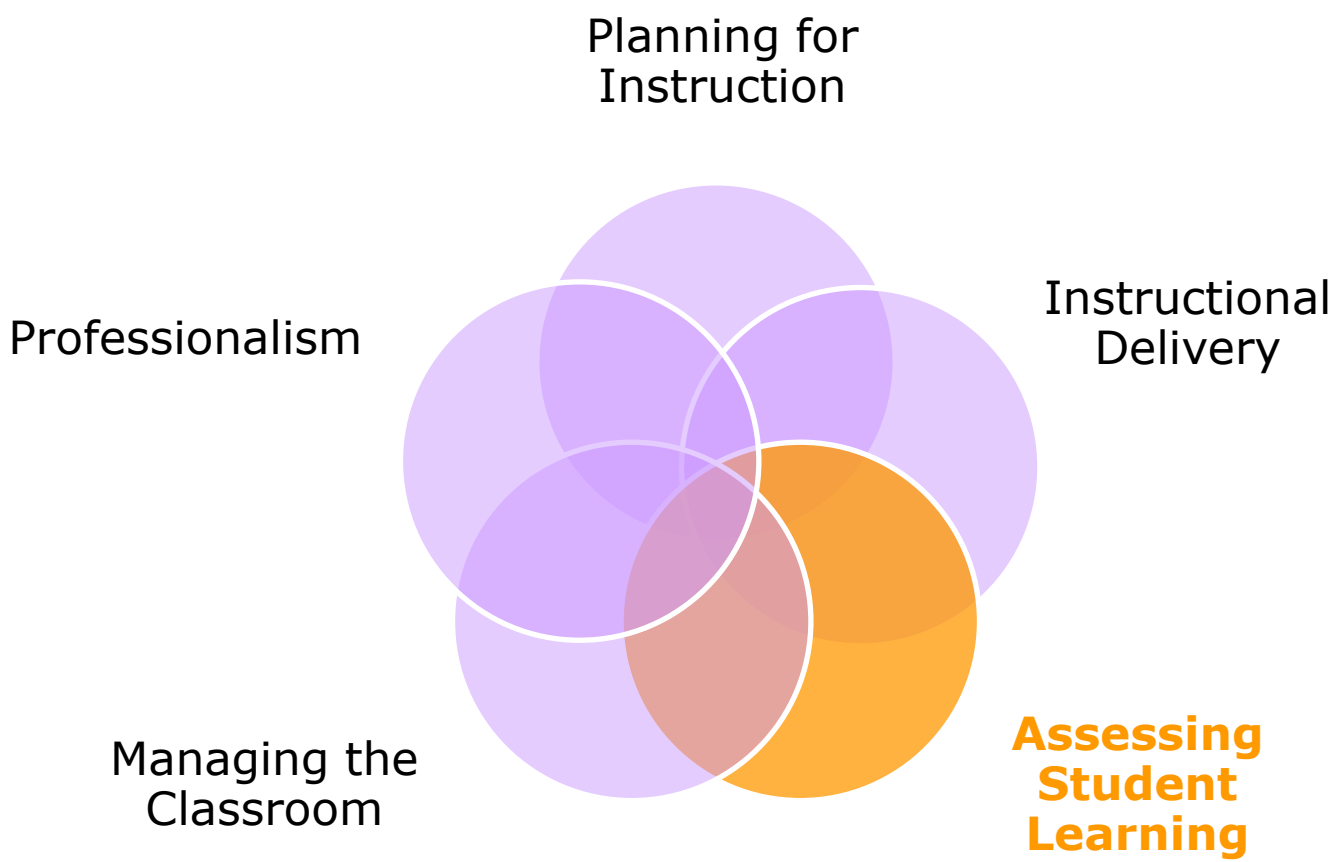
Guiding Questions of Our Work

1. **How** do teachers typically assess student learning?
2. **Why** do teachers assess learning?
3. How do teachers actually **use assessment results**?
4. What **competencies** related to assessment are most important for teachers to master?
5. How are teachers **prepared** in these competencies?
6. What should be the relationship between classroom-based assessment and **external assessments**?



The Role of Assessment



Assessment Matters

- Assessment Reform Group. 1999. *Assessment for learning: Beyond the black box.* Cambridge: Cambridge University.
- McMillan, J. H. (Ed.). 2013. *SAGE Handbook of Research on Classroom Assessment*. Los Angeles, CA: SAGE.

Assessment: A relative weakness in teachers' professional practice

- 2003: Assessment was the ***LEAST*** **adequately documented domain of teaching responsibility** among in-service teachers (Tucker, Stronge, & Gareis, 2003)
- 2006: "[It] became apparent that student **assessment was surprisingly rare and haphazard.** Students would spend days, even weeks, on activities without being assessed." (Schmoker, 2006)
- 2006: Assessment is the **weakest competency of first-year teachers** (Good, McCaslin, Tsang, et al., 2006)
- 2010: "**Monitoring student learning"** is perceived by school administrators and teachers as **the *LEAST* important of 5 domains of teacher effectiveness** (Williams, 2010, *unpublished dissertation*)
- 2013: "Research suggests that **despite assessment education efforts, beginning teachers continue to feel unprepared to assess student learning**." (DeLuca & Bellara, 2013).

Council for the Accreditation of Educator Preparation (CAEP)

Conclusion

Pre-service preparation in assessment literacy has historically been "incomplete and superficial."

Recommendation

"Flesh out the domain of assessment literacy into a coherent and comprehensive set of objectives and learning targets to provide specificity needed for designing effective curricula, instructional materials, practica, and formative and summative performance measures."

Kahl, S. R., Hofman, P., & Bryant, S. (2013). *Assessment literacy standards and performance measures for teacher candidates and practicing teachers.* Prepared for the Council for the Accreditation of Educator Preparation. Dover, NH: Measured Progress.

Table 1: The Domain of Assessment Literacy for Teachers and School Administrators

Standards	Teachers must be able to create/select and effectively use classroom assessments for a variety of purposes.		Teachers and administrators must be able to select and effectively interpret and use results from external interim and summative assessments designed for a variety of purposes.
Category of Measures	**Formative**	**Classroom Summative**	**External Interim and Summative**
Types of Measures	• Formative assessment evidence gathering techniques	• Selected-response • Constructed-response • Performance tasks • Portfolios	• District benchmark • Diagnostic • General achievement • Adaptive • State accountability

Quality of Measures	• Unpacking standards
	• Depth of knowledge
	• Quality of evidence regarding learning targets
		• Good and bad items/tasks
		• Reliability and validity
		  - Test length
		  - Domain representation (See "Alignment")
			• Match to purpose
			• Universal Design
			• Item quality in banks and tests
			• Item selection criteria
			• Alignment
			  - Categorical concurrence
			  - Depth of knowledge
			  - Range of knowledge
			  - Balance of representation
			• Technical characteristics (reliability, validity)

Results and Their Use	• Quality and use of feedback
	• Use of data to inform instruction
		• Scores vs. grades
		• Effective and detrimental grading practices
			• Reporting statistics
			  - Scaled scores
			  - Percentile ranks
			  - Performance levels
			• Subgroup/subtest results
			• "Growth" and longitudinal data
			• Comparability issues

Kahl, Hofman, & Bryant (2013), p. 5

"Teachers must be able to create/select and effectively use classroom assessments for a variety of purposes."

Types of Measures

- Item & assessment types (i.e., select-response, constructed-response, and performance tasks)

Quality of Measures

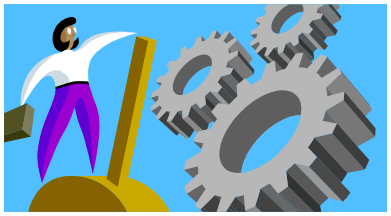
- Unpacking standards
- Depth of knowledge (i.e, level of cognition)
- Validity & reliability
- Domain representation (i.e., alignment)

Results and Their Use

- Use of data to inform instruction

Kahl, Hofman, & Bryant (2013), p. 5

Our Approach



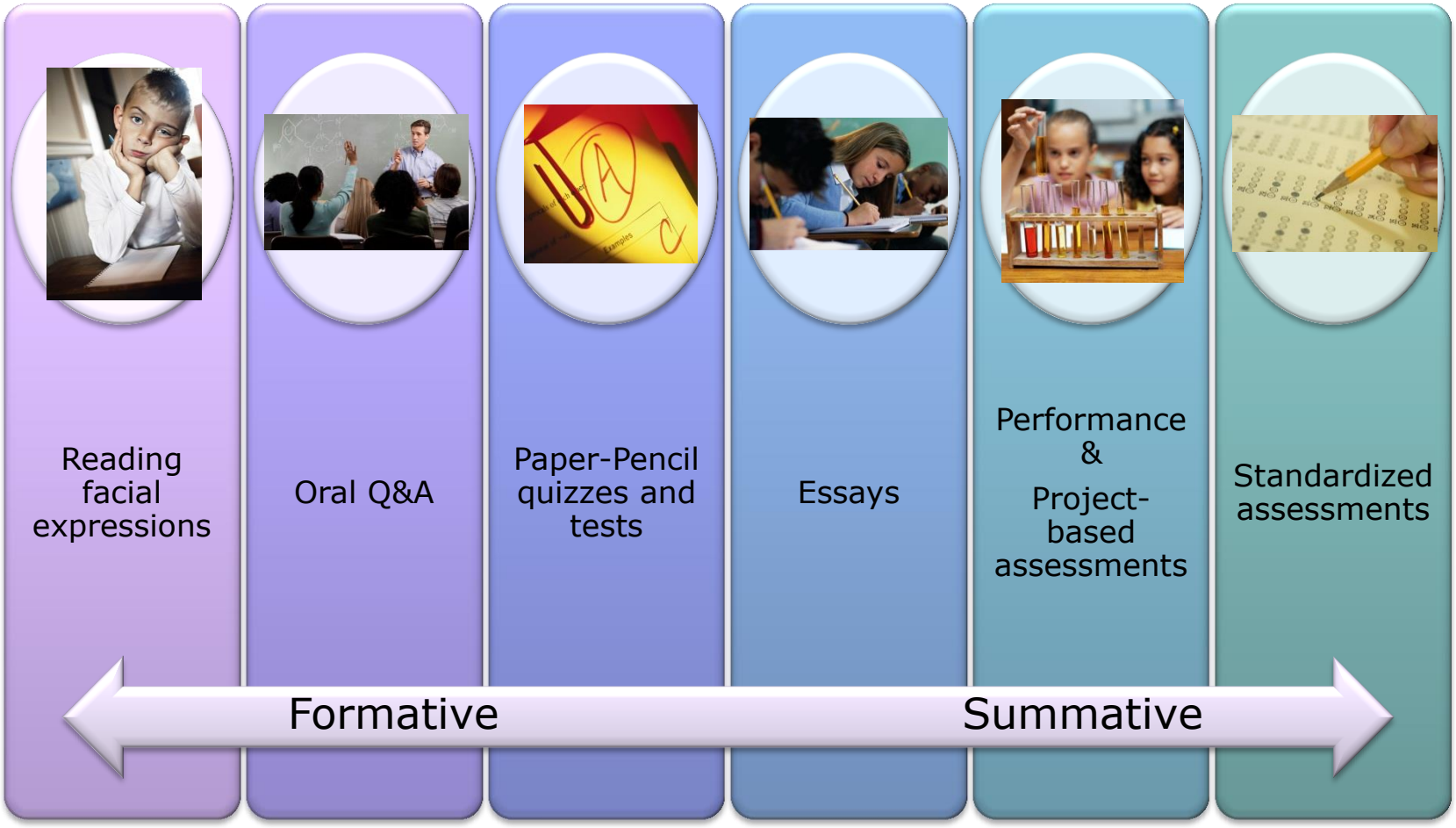
3 Leverage Points

1. **Unpacking curriculum**, especially for targeted cognitive behaviors
2. Creating and using **assessment blueprints**
3. Creating and using **common assessments**

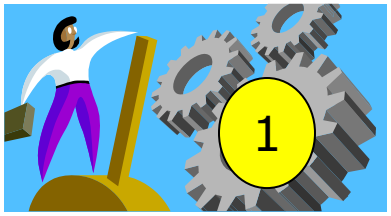
Assessment Literacy

A teacher's knowledge, skills, and wherewithal to construct and use relevant and dependable assessment instruments and techniques as part of the teaching process in order to progress students' learning.

The Spectrum of Classroom-based Assessments



“Unpacking” ***Curriculum***

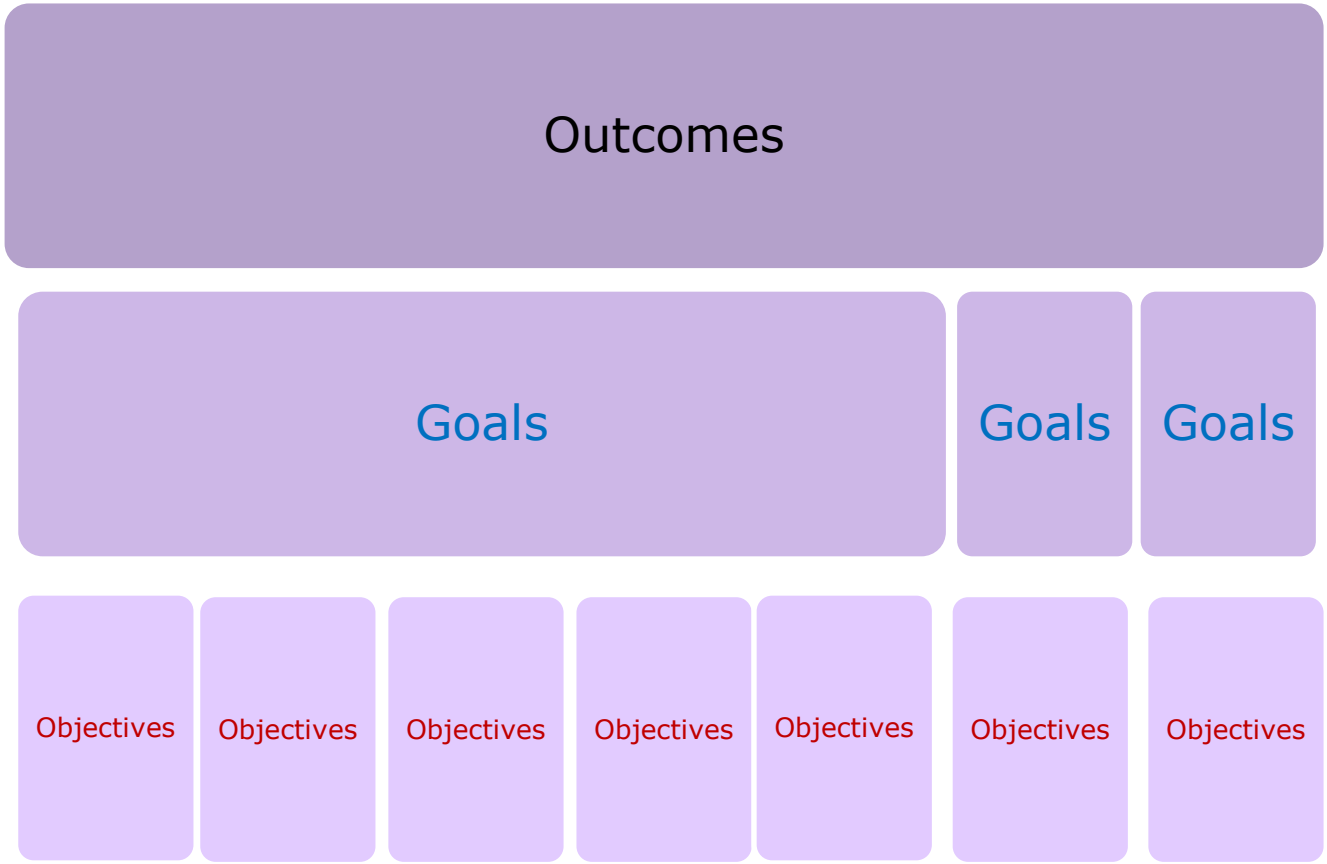


A set of *intended learning outcomes* for students

The student will be a confident person, a self-directed learner, an active contributor, and a concerned citizen.

Each student will become a lifelong learner, independent thinker, and responsible citizen.

Curriculum as *Intended Learning Outcomes*



Components of an *Intended Learning Outcome*

The student will explain the associative property.

The student — Audience

will explain — Cognitive behavior (usually a verb)

the associative property — Content

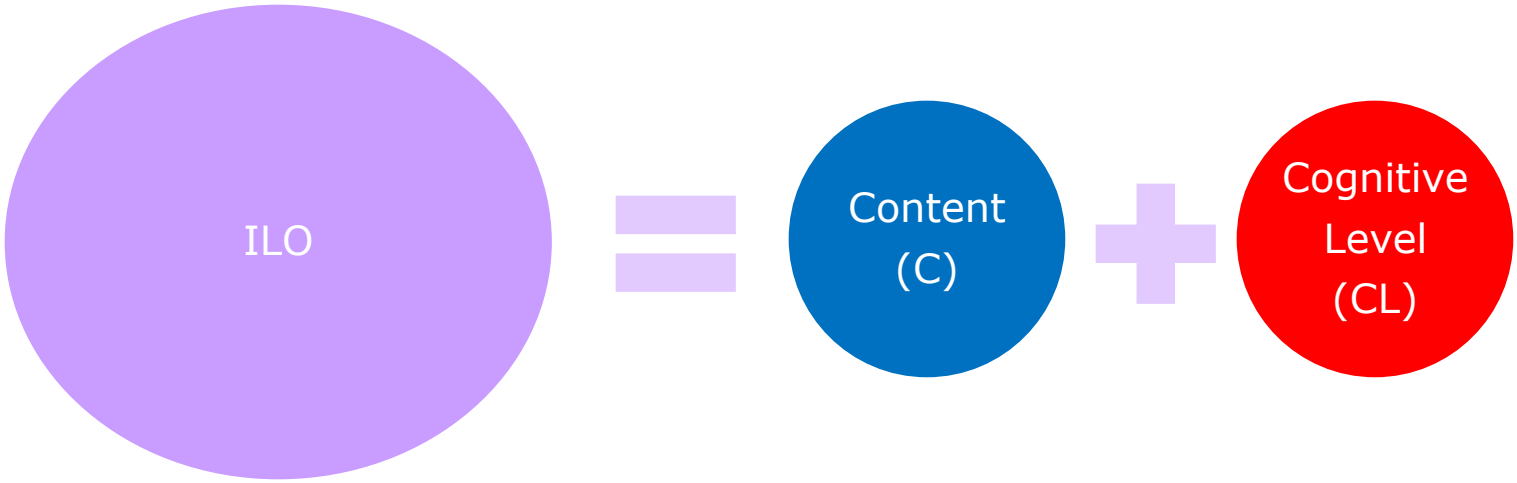
The Importance of Cognitive Action

1. The student will list the elements of narrative structure.

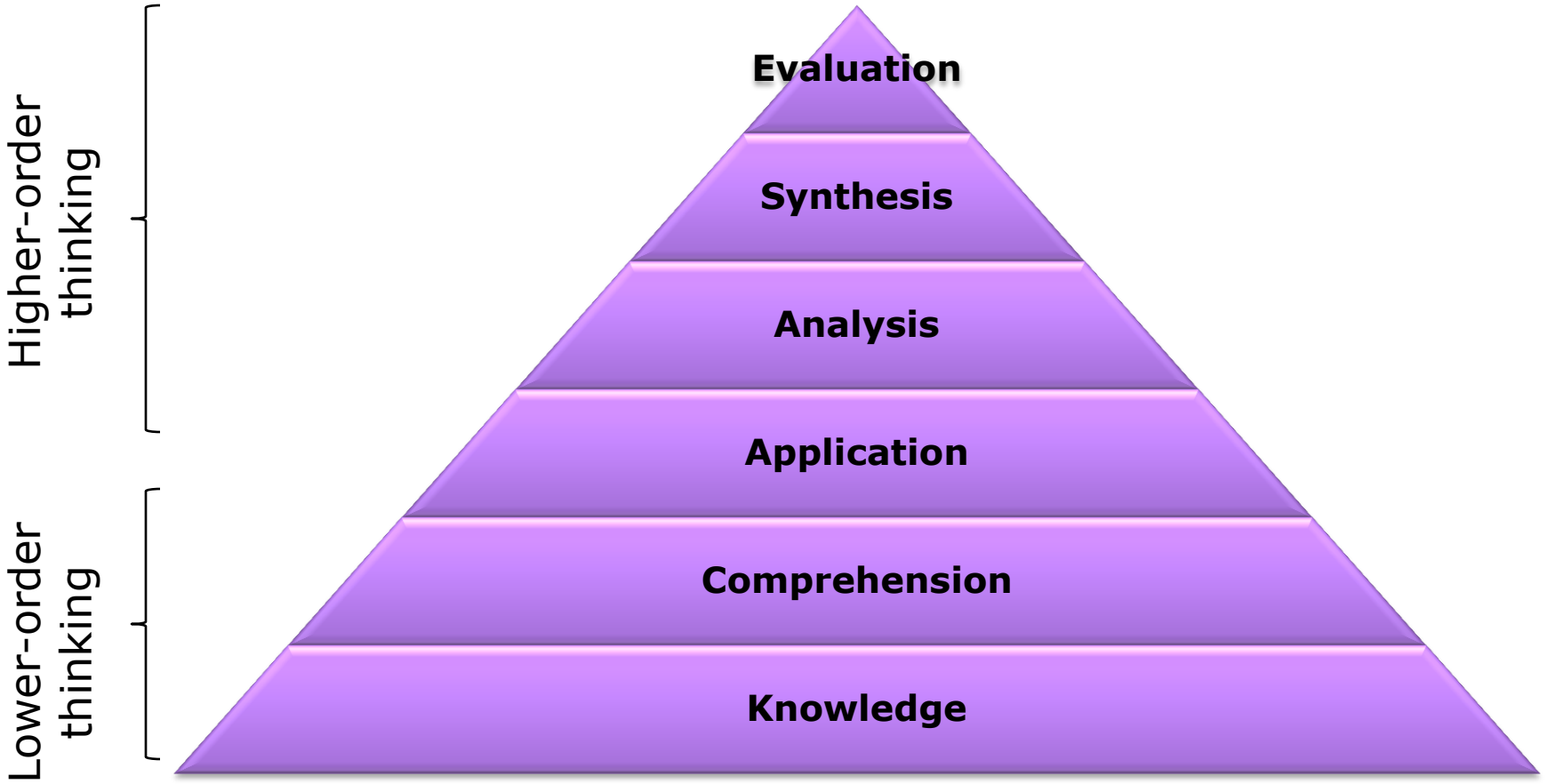
2. The student will describe the elements of narrative structure.

3. The student will determine the elements of narrative structure.

Unpacking
Intended Learning Outcomes



Bloom's Taxonomy of Cognitive Behaviors



Unpacking ILOs

1. The student will identify the narrator of a short story. (Co)
2. The student will find the surface area of a rectangular prism. (Ap)
3. The student will list the qualifications necessary to vote in Virginia and describe the process for registering to vote in Virginia. (Kn, Kn)
4. The student will create a diagram that demonstrates the steps in the cell cycle, including the phases of mitosis. (Co)

Unpacking ILOs

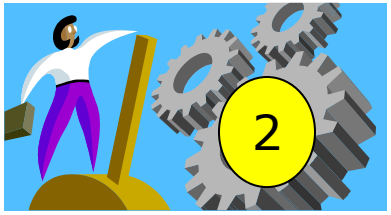
5. The student will write a persuasive essay on a school-wide issue. (Ev)
6. The student will verify the properties of circles. (Ap)
7. By reviewing slogans in post-World War II America, the student will describe changes in economic opportunities for women. (An, An)

The Primacy of Cognition

"The Common Core State Standards (CCSS) present a new mandate and challenge for K-12 educators—teaching and reinforcing **cognitive verbs**. These verbs, referred to as *academic vocabulary,* signal the type of mental operations that students are expected to perform."

Robert J. Marzano
in *Educational Leadership*
(Sept. 2013)

Creating & Using a **Table of Specifications**



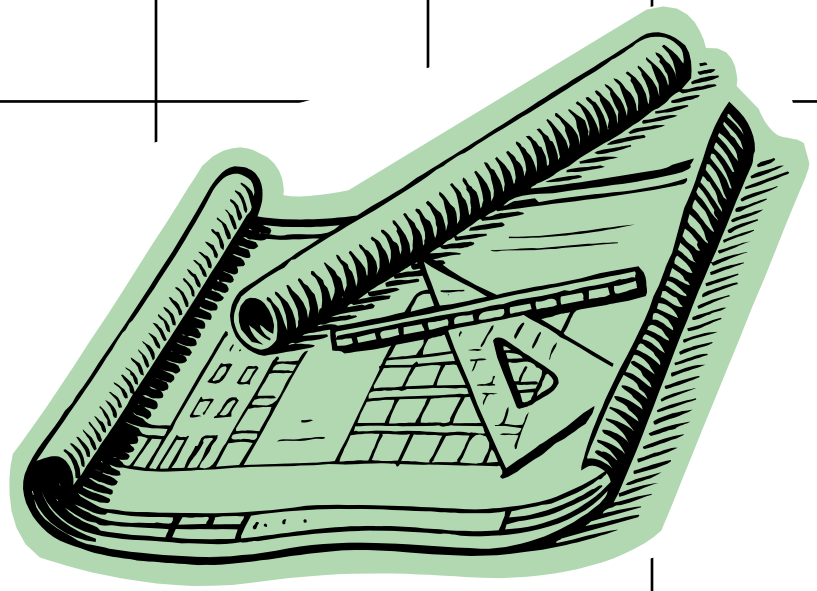
A ***blueprint*** for what should be included (and should <u>not</u> be included) on an assessment

Grade 8 Reading
Test Blueprint Summary Table

Reporting Category	Grade 8 Reading Standards of Learning	Number of Items
Use word analysis strategies and word reference materials	8.4 a-d	8
Demonstrate comprehension of fictional texts	8.5 a-k	17
Demonstrate comprehension of nonfiction texts	8.6 b-k	20
Excluded from Testing	8.4 e-f 8.5 l-m 8.6 a, l	
Number of Operational Items		45
Number of Field Test Items*		10
Total Number of Items on Test		55

*Field test items are being tried out with students for potential use on subsequent tests and will not be used to compute students' scores on the test.

Content	Cognitive Level					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation



Steps to Create a Table of Specifications

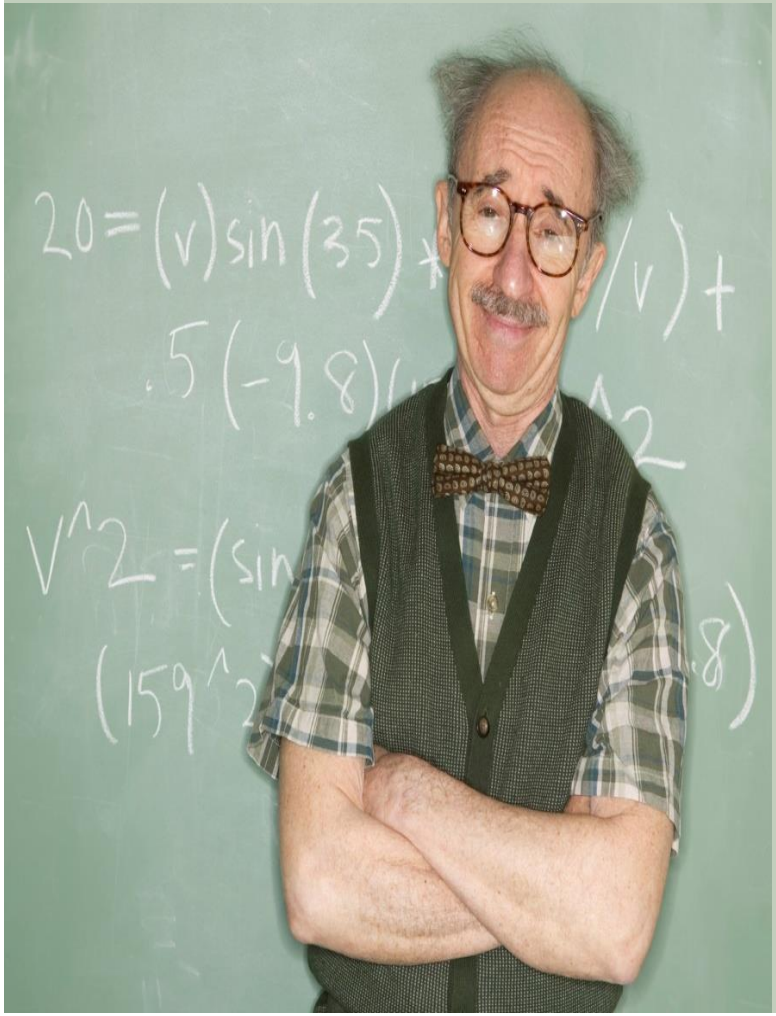
Step #1 – **Unpack** intended learning outcomes for…

- Content
- Cognitive level

Step #2 – Plot the **intersection** between the content and level of cognitive demand for each learning objective on a matrix

Step #3 – If helpful, indicate the **relative emphasis** of each intersection on the chart

4 Practical Uses of a Table of Specifications



1) Create an assessment

2) Critique and improve a current assessment

3) Create a unit assessment plan

4) Analyze student learning

6th Grade Unit: "Resource Use and Conservation" (Science SOL 6.9)

Science SOL 6.9 Overview

The strand focuses on student understanding of the role of resources in the natural world and how people can utilize those resources in a sustainable way. An important idea represented in this strand is the importance of managing resources. This begins with basic ideas of conservation and proceeds to more abstract consideration of costs and benefits. The topics developed include conservation of materials, soil and plants as resources, energy use, water, Virginia's resources, and how public policy impacts the environment.

ILOs for the "Resource Use and Conservation" Unit (Science 6.9)

The student will:

a. Differentiate between renewable and nonrenewable resources. CO

b. Describe the role of local and state conservation professionals in managing natural resources. These include wildlife protection; forestry and waste management; and air, water, and soil conservation. CO

c. Analyze reports, media articles, and other narrative materials related to waste management and resource use to determine various perspectives concerning the costs/benefits in real-life situations AN CO

d. Analyze how renewable and nonrenewable resources are used and managed within the home, school, and community AN

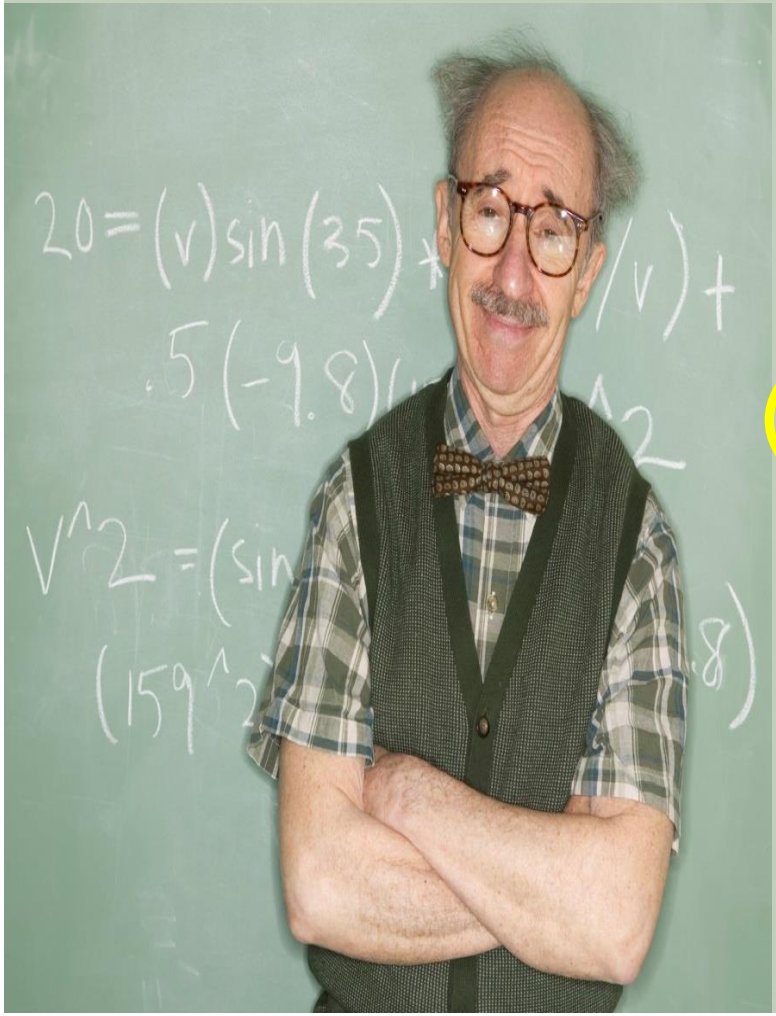
e. Analyze resource-use options in everyday activities and determine how personal choices have costs and benefits related to the generation of waste. EV

f. Evaluate the impact of resource use, waste management, and pollution prevention in the school and home environment EV

Content	Bloom's Taxonomy					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Renewable and nonrenewable resources		✓ Differentiate between				
Role of local and state conservation professionals in managing natural resources		✓ Describe				
Reports, media articles, etc., that give various perspectives on costs/benefits in real-life situations		✓ Determine		✓ Analyze		
Resource use and management in the home, school, and community				✓ Analyze		
Resource use options in everyday activities and cost/benefits of personal choices in relation to waste generation				✓+ Analyze		✓+ Determine personal choices
Impact of resource use, waste management, and pollution prevention in school and at home						✓ Evaluate

What would you expect to see on a test that assesses these ILOs?

4 Practical Uses of a Table of Specifications



1) Create an assessment

2) Critique and improve a current assessment

3) Create a unit assessment plan

4) Analyze student learning

1) Which of these is a nonrenewable resource?

A. fossil fuels
B. sunlight
C. trees
D. wind

What **content** does this item assess and at what **cognitive level**?

Content	Bloom's Taxonomy					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Renewable & nonrenewable resources	1	✓ Differentiate between				
Role of local and state conservation professionals in managing natural resources		✓ Describe				
Reports, media articles, etc., that give various perspectives on costs/benefits in real-life situations		✓ Determine		✓ Analyze		
Resource use and management in the home, school, and community				✓ Analyze		
Resource use options in everyday activities and cost/benefits of personal choices in relation to waste generation				✓+ Analyze		✓+ Determine personal choices
Impact of resource use, waste management, and pollution prevention in school and at home						✓ Evaluate

9) **Because burning fossil fuels creates much pollution, alternatives are being investigated. What might limit the use of wind as a major energy source?**

F The strength of the wind varies.

G Wind machines have huge blades to capture the wind.

H Turbines and generators in the wind machines create electricity.

J Wind power does not create pollution.

Content	Bloom's Taxonomy					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Renewable & nonrenewable resources	1	✓ Differentiate between				
Role of local and state conservation professionals in managing natural resources		✓ Describe				
Reports, media articles, etc., that give various perspectives on costs/benefits in real-life situations		✓ Determine 9		✓ Analyze		
Resource use and management in the home, school, and community				✓ Analyze		
Resource use options in everyday activities and cost/benefits of personal choices in relation to waste generation				✓+ Analyze		✓+ Determine personal choices
Impact of resource use, waste management, and pollution prevention in school and at home						✓ Evaluate

14) **Because it can be transported easily and converted into other forms of energy, the energy form *most* commonly used in households is —**

F chemical

G nuclear

H heat

J electrical

Content	Bloom's Taxonomy					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Renewable & nonrenewable resources	1	✓ Differentiate				
Role of local and state conservation professionals in managing natural resources		✓ Describe				
Reports, media articles, etc., that give various perspectives on costs/benefits in real-life situations		✓ Determine 9		✓ Analyze		
Resource use and management in the home, school, and community	14			✓ Analyze		
Resource use options in everyday activities and cost/benefits of personal choices in relation to waste generation				✓+ Analyze		✓+ Determine personal choices
Impact of resource use, waste management, and pollution prevention in school and at home						✓ Evaluate

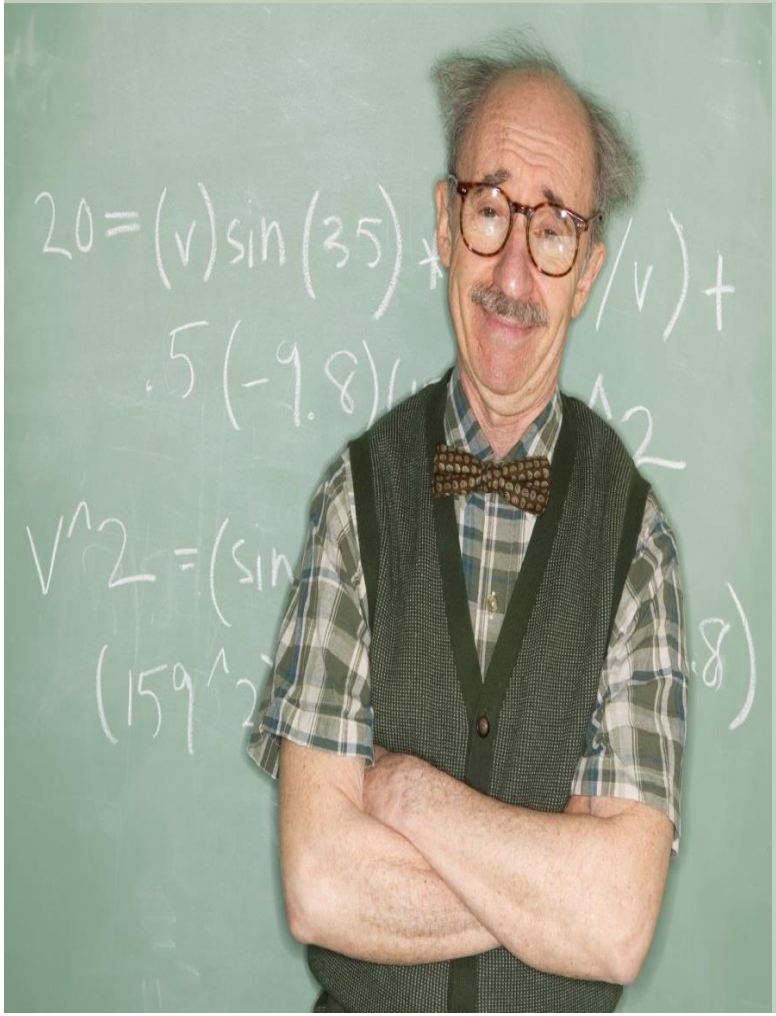
Content	Bloom's Taxonomy					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Renewable & nonrenewable resources	1, 2, 16	✓ Differentiate				
Role of local and state conservation professionals in managing natural resources	11	✓ Describe 20		5, 10		
Reports, media articles, etc., that give various perspectives on costs/benefits in real-life situations		✓ Determine 9	7, 12, 15	✓ Analyze 4, 8		
Resource use and management in the home, school, and community	14	6		✓ Analyze		
Resource use options in everyday activities and cost/benefits of personal choices in relation to waste generation		17		✓+ Analyze		✓+ Determine personal choices
Impact of resource use, waste management, and pollution prevention in school and at home		3, 13, 18, 19				✓ Evaluate

How VALID is this test?

Content	Bloom's Taxonomy					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Renewable & nonrenewable resources	1, 2	✓ Differentiate 5, 10, 16				
Role of local and state conservation professionals in managing natural resources	11	✓ Describe 7, 20, 24				
Reports, media articles, etc., that give various perspectives on costs/benefits in real-life situations		✓ Determine 9, 12		✓ Analyze 4, 8, 21		
Resource use and management in the home, school, and community	14	6		✓ Analyze 18, 19, 25		
Resource use options in everyday activities and cost/benefits of personal choices in relation to waste generation		17		✓+ Analyze 15, 22, 23		✓+ Determine personal choices
Impact of resource use, waste management, and pollution prevention in school and at home		3, 13				✓ Evaluate

Is this a more **valid** test?

4 Practical Uses of a Table of Specifications



1) Create an assessment

2) Critique and improve a current assessment

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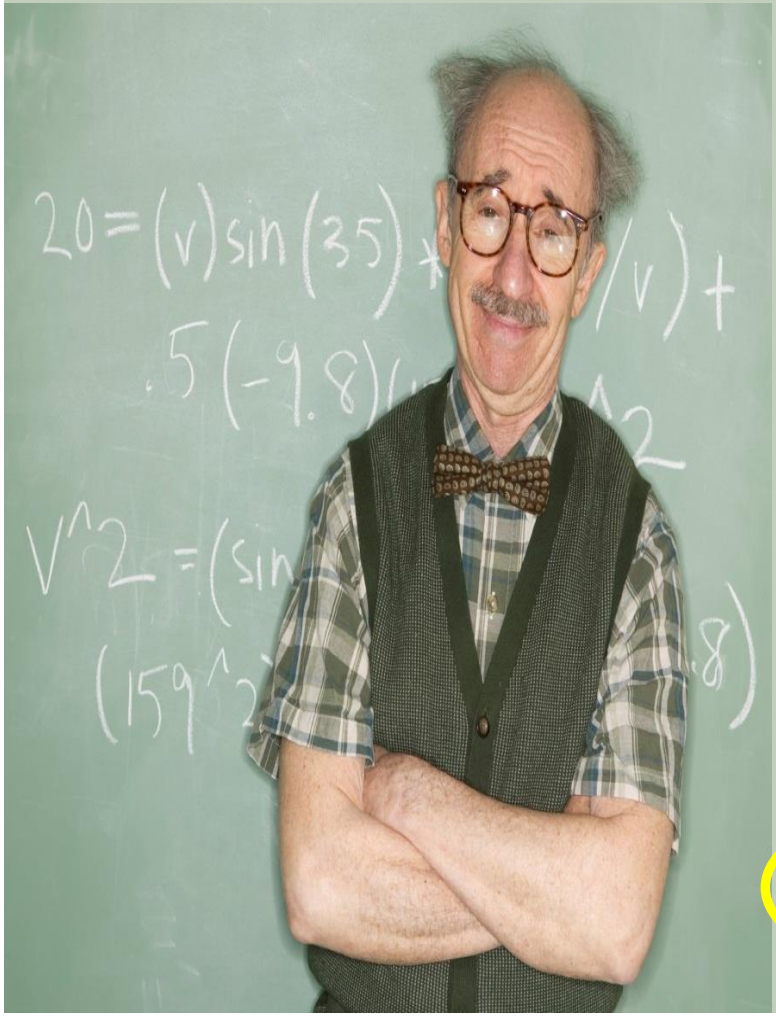
Content	Bloom's Taxonomy					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Renewable & nonrenewable resources	MC Test	✓ Differentiate MC Test				
Role of local and state conservation professionals in managing natural resources	MC Test	✓ Describe MC Test				
Reports, media articles, etc., that give various perspectives on costs/benefits in real-life situations		✓ Determine MC Test		✓ Analyze MC Test		
Resource use and management in the home, school, and community	MC Test	MC Test		✓ Analyze MC Test		
Resource use options in everyday activities and cost/benefits of personal choices in relation to waste generation		MC Test		✓+ Analyze MC Test		✓+ **Determine personal choices**
Impact of resource use, waste management, and pollution prevention in school and at home		MC Test				✓ **Evaluate**

Using a TOS as a **"unit assessment plan"**

Personal Resource Use Project

4 Practical Uses of a Table of Specifications



1) Create an assessment

2) Critique and improve a current assessment

3) Create a unit assessment plan

4) Analyze student learning

Sample Unit Test Results

Class Average: 84

Grade Distribution:

	A	B	C	D	F
# of students	14	20	10	1	5

Sample Unit Test Results: **Item Analysis**

1. **95%**
2. **95%**
3. 85%
4. **95%**
5. 75%
6. 75%
7. 85%
8. 90%
9. **100%**
10. 80%
11. 85%
12. **100%**
13. 85%
14. 90%
15. 85%
16. 80%
17. 80%
18. ***50%***
19. ***45%***
20. 85%
21. **100%**
22. 80%
23. 90%
24. ***20%***
25. ***50%***

Average Score: 84%

Content	Bloom's Taxonomy					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Renewable & nonrenewable resources	**1, 2**	✓ Differentiate 5, 10, 16				
Role of local and state conservation professionals in managing natural resources	11	✓ Describe 7, 20, ***24***				
Reports, media articles, etc., that give various perspectives on costs/benefits in real-life situations		✓ Determine **9, 12**		✓ Analyze **4**, 8, **21**		
Resource use and management in the home, school, and community	14	6		✓ Analyze ***18, 19, 25***		
Resource use options in everyday activities and cost/benefits of personal choices in relation to waste generation		17		✓ Analyze 15, 22, 23		✓+ Determine personal choices
Impact of resource use, waste management, and pollution prevention in school and at home		3, 13				✓ Evaluate

What inferences can we draw about student learning?

What can we **infer** about the learning of each of these three "B" students?

Azman

- Unit Test Grade: 84
- Items Missed: 4, 15, 22, 25

Beatrice

- Unit Test Grade: 84
- Items Missed: 7, 11, 20, 24

Lei

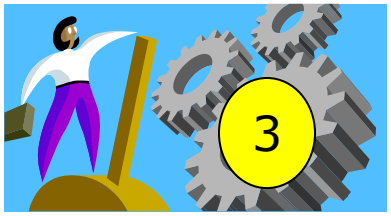
- Unit Test Grade: 84
- Items Missed: 3, 8, 10, 14

Content	Bloom's Taxonomy					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Renewable & nonrenewable resources	1, 2	✓ Differentiate 5, 10, 16				
Role of local and state conservation professionals in managing natural resources	11	✓ Describe 7, 20, 24				
Reports, media articles, etc., that give various perspectives on costs/benefits in real-life situations		✓ Determine 9, 12		✓ Analyze 4, 8, 21		
Resource use and management in the home, school, and community	14	6		✓ Analyze 18, 19, 25		
Resource use options in everyday activities and cost/benefits of personal choices in relation to waste generation		17		✓ Analyze 15, 22, 23		✓+ Determine personal choices
Impact of resource use, waste management, and pollution prevention in school and at home		3, 13				✓ Evaluate

Analyzing Student Learning

1. To make instructional decisions
2. To communicate the nature and degree of learning to others, including providing feedback to students
3. To improve the validity and reliability of assessments

Creating & Using **Common Assessments**



An assessment instrument or technique created and used by a team of teachers at the building level for purposes of:

- Relevantly and accurately monitoring student progress
- Making worthwhile instructional decisions
- Meaningfully reporting to others

Education Policy Context in the U.S.

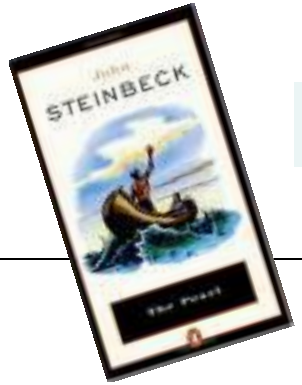
50 States

13,809 Public School Districts

> 1,100 Teacher Preparation Programs

The U.S Education Context

- Ubiquitous role of **standards and accountability**, although education remains a state- and local-level responsibility
- Long history of teacher autonomy giving way to new emphases on **vertical and horizontal articulation** of the curriculum
- Ongoing political tensions resulting from the simultaneous **over-regulation and de-professionalization** of teacher preparation
- Increasing use of **student growth models** for teacher evaluation
- Increased emphasis on the role of **classroom-based assessment and professional learning communities**.



"Table of Specifications" for *The Pearl* Unit

	Knowledge	Compre-hension	Application	Analysis	Synthesis	Evaluation
Literary terms •Metaphor •Simile •Allusion •Symbol	✓	✓+	✓+			
Facts about the author	✓-					
Elements of the story •Plot •Setting •Characters •Narrative	✓	✓	✓			
Themes of the story			✓+	✓+	✓	✓

Table of Specifications

6th Grade Math (SOL 6.1 & 6.4)

Content	Knowledge	Compre-hension	Application	Analysis	Synthesis	Evaluation
Two **rational numbers** • Concrete objects • Pictures • Symbols			✓ Represent	✓ Compare Order*		
Two **whole numbers** • Concrete objects • Pictures • Symbols			✓ Represent	✓ Compare Order		
Two **fractions** with denominators of ≤ 12 • Concrete objects • Pictures • Symbols			✓ Represent	✓ Compare Order		
Two **decimals** through thousandths • Manipulatives • Pictures • Place-value charts • Symbols			✓ Represent	✓ Compare		
Meaning of "**%**"		✓ Recognize Understand				
Decimal and percent equivalents for ½, 1/3, ¼, 1/5, 1/10	✓ Identify					
Equivalent relationships among decimals, percents, & fractions with denominators that are factors of 100		✓ Describe Understand	✓ *Represent (if novel)*	✓ *Analyze (if novel)*		
Shaded 10x10 grids to represent decimals, percents, & fractions		✓ Draw ✓ Represent	✓ Draw (if novel) ✓ Represent (if novel)			

* "order" = *sequence*

	COGNITIVE BEHAVIORS											
CONTENT	Knowledge		Comprehension		Application		Analysis		Synthesis		Evaluation	
	SOL	Test	SOL	Test	SOL	Test	SOL	Test	SOL	Test	SOL	Test
Citizenship skills (CE.1)									x			
Primary and secondary source documents (Ce.1a)							x					
Foundations of American constitutional government (CE.2)		XX	x									
Consent of the governed(CE.2A)		XX	x									
Limited government(CE.2A)		X	x									
Rule of law(CE.2A)			x									
Democracy(CE.2A)		X	x	X								
Representative Government(CE.2A)			x									
Charters of the VA company of London(CE.2B)		X	x									
VA Declaration of Rights(CE.2B)			x									
Declaration of Independence(CE.2B)		X	x									
Articles of Confederation(CE.2B)		XX	x									
VA Statute for Religious Freedom(CE.2B)		X	x									
Constition of the US(CE.2B)		XXXXXXX	x									
Bill of Rights(CE.2B)		XXXXXXXXXXX	x									
Citizenship and rights, duties, & responsibilities of citizens(CE.3)			x									
Process of becoming a citizen(CE.3A)		X	x									
First Amendment		X	x									
Due process guaranteed rights(CE.3B)		XXX	x									
Equal protection of the laws(CE3.B)		XXX	x									
Duties of citizenship(CE.3C)			x									
Responsibilities of							x					
Civic & social duties address community needs and serve public good(CE.3E)											x	
American constitutional govt.(CE.6)			x									
State & Nat'l Govt. relationship in the federal system (CE.6A)		XXXXXX	x									
Principle of separation of powers(CE.6C)		X	x									
Operation of checks and balances(CE.6C)			x	X								
Procedures for amending the Constitution of the US(CE.6D)		XXX	x									
Judicial systems established by Constitutions of VA & US(CE.8)			x									
Exercise of judicial review(CE.8B)			x									
Due process protections seek to ensure justice(CE.8D)		XXXXX	x									

"Unpacked" the unit's objectives

"Unpacked" our test questions

Charters of the VA company of London(CE.2B)		X	x
VA Declaration of Rights(CE.2B)			x
Declaration of Independence(CE.2B)		X	x
Articles of Confederation(CE.2B)		XX	x
VA Statute for Religious Freedom(CE.2B)		X	x
Constition of the US(CE.2B)		XXXXXX	x
Bill of Rights(CE.2B)		XXXXXXXX	x
Citizenship and rights, duties, & responsibilities of citizens(CE.3)			x
Process of becoming a citizen(CE.3A)		X	x
First Amendment freedoms(CE.3B)		X	x

Why are there no questions for this standard?

Why so many questions for these two standards?

Is this content more important?

Table of Specifications: Skilled Based Learning Assessments

Aha Moment!
Currently used "fun" activities could facilitate and assess higher cognitive levels when properly structured

Aha Moment!
Ongoing "essential skills" target higher-order thinking

Ongoing Curriculum Skills wit	COGNITIVE BEHAVIORS					
PCS – Political Cartoon Study BR – Brochure Development MS – Map Skills *EMPHASIS OF ONGOING ENT	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
*Analyze and interpret primary sources (USII 1				✓	✓	✓
Growth of Cities (USII 3.d)				PCS	PCS	PSC
*Make connections between past and present (U					✓	
Constraints Faced by Africa						
Women Suffrage / Ten				BR	BR	BR
Sequence events in U.S. from 1877 to present (USII 1.1c)			✓	✓		
*Interpret ideas and events from different historical perspectives (USII 1.1d)						✓
Women Suffrage / Temperance (USII 3.e)						BR
Evaluate and debate issues orally and in writing						✓
Analyze and interpret maps that include major feature physical features				✓	✓	
Women Suffrage (USII 3.e)				MS		
Use parallels of latitude and meridians of longitude to describe hemispheric location		✓	✓			
Interpret (create) patriotic slogans and excerpts from notable speeches/documents					✓	
					BR	

Content	Bloom's Taxonomy					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Question that will guide the data collection		1,2,3			✓ Formulate	
Data collection using observations, measurement, or surveys			✓ Collect Use **4,5**			
Data into a chart and/or a table		✓ Organize **12,16**				
Line graphs		✓ Label/Title 7,8,9	✓+ Construct **6,14**,19			
Stem-and-leaf plots	10	✓ Title 11	✓+ Construct **13**,17,18			
Mathematical reasoning to answer the question		✓ Write		✓+ Interpret **15,20**	✓ Reason Conclude/ Predict	
~~{Pie chart}~~ ~~{Bar chart}~~						

Using a TOS as a **"unit assessment plan"**

Conte	Bloom's Taxonomy					
			Application	Analysis	Synthesis	Evaluation
Question that wi… the data collection		Test			✓ **Formulate**	
Data collection using observations, measurement, or surveys			✓ Collect Use Test			
Data into a chart and/or a table		✓ Organize Test				
Line graphs		✓ Title Test	✓+ Construct Test			
Stem-and-leaf plots	Test	✓ Title Test	✓+ Construct Test			
Mathematical reasoning to answer the question		✓ **Write**		✓+ **Interpret** Test	✓ **Reason Conclude /Predict**	
~~{Pie chart}~~ ~~{Bar chart}~~						

Investigation Project

Using a Table of Specifications to Critique and Improve Our Assessment

Content	Bloom's Taxonomy					
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Major rock-forming and ore minerals based on physical and chemical properties: hardness, color and streak, luster, cleavage, fracture, and unique properties.	31,32,33,34, 35	X identify 21,22,24,25, 26,27,28,29, 30	39	X investigate 23,35,36,37		
Uses of minerals		X identify		X investigate		
Determine unknown minerals based upon physical and chemical prop			X solve	X compare 19		
The rock cycle as it relates and transformation of rock	20	X interpret 1, 2, 12		X investigate 3		
Common rock types based on mineral composition and textures	5, 6, 7, 9 , 10, 14	13	X solve	X compare		
Intrusive extrusive igneous rocks	4	8	15, 16, 17, 18	X compare		
Chemical and clastic sedimentary rocks				X differentiate		
Foliated and Nonfoliated Metamorphic Rocks		11		X differentiate		

Oversampling cognitive level

Under-sampling the content

Missing the mark on cognitive level

Analyzing Assessment Results and Making Decisions

	Bloom's Taxonomy					
Content	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
[illegible]ology [illegible]e ocean [illegible]nent		X 5, 14, 17, 22, 26				
[illegible]nd major [illegible]es	X 1, 2, 3, 4	X 8, 13, 19, 21		X Class Project	X Class Project	
Variation in depths associated with ocean features		X 1, 2, 3, 4, 13, 19, 24	X Class Project			
Physical characteristics of the ocean environment				X 7, 9, 25, 27, 28, 29, 30, 31	X Class Project	
Formation of ocean currents	X 6, 18, 23	X 10, ***12, 15***				
Biological characteristics of the ocean environment				X 11, 17, 22, 32, 34	X Class Project	
Physical characteristics affects on biological characteristics				X ***16***, 20, 33		

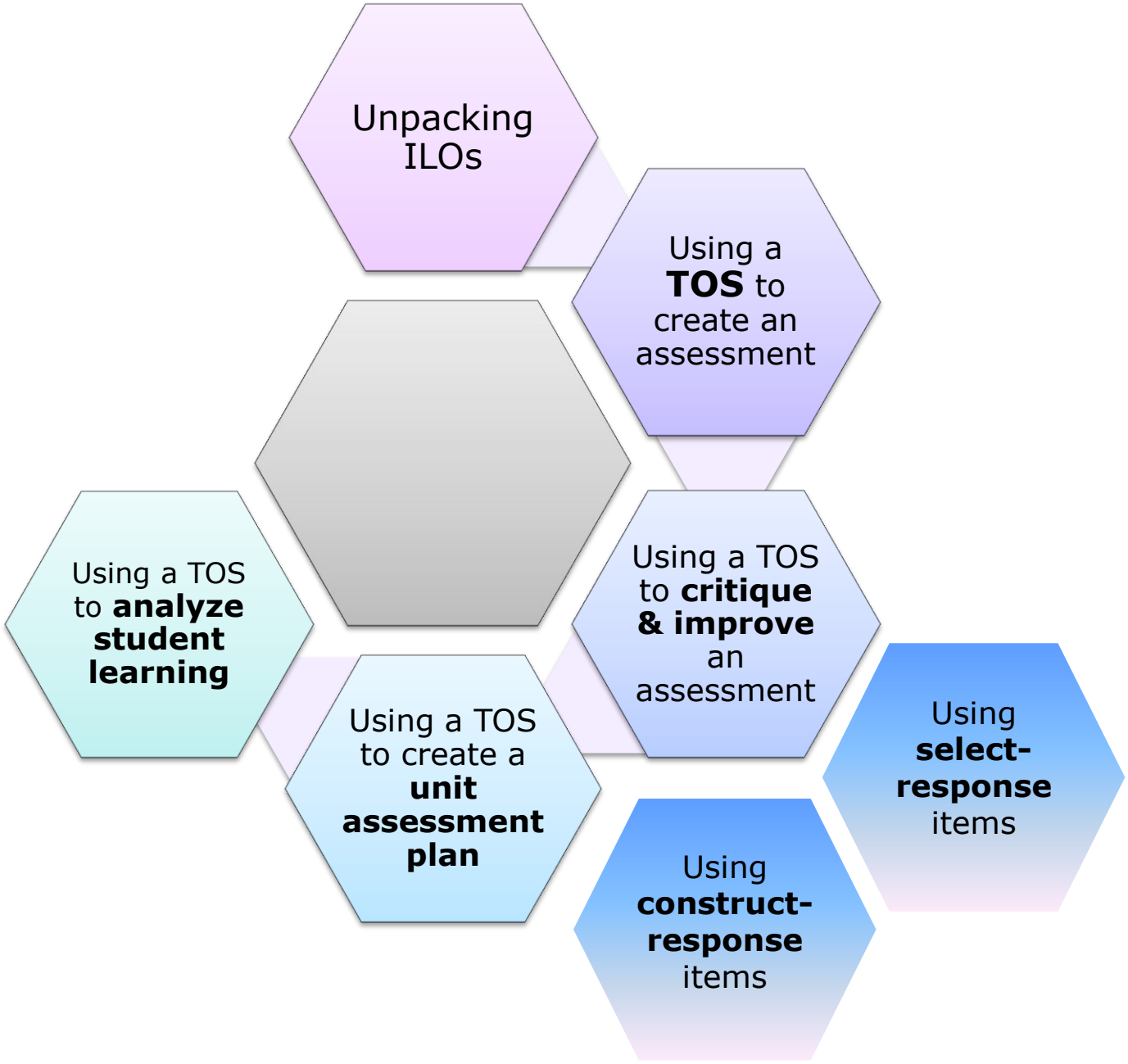
Key: Underlined Numbers = Over 90% of students responded correctly

Bold and Italicized Numbers = 50% or less of students responded correctly

Area of Concern for Whole Class
- re-teach
- re-assess students

Jason responded incorrectly to most of these items
- re-teach
- re-assess

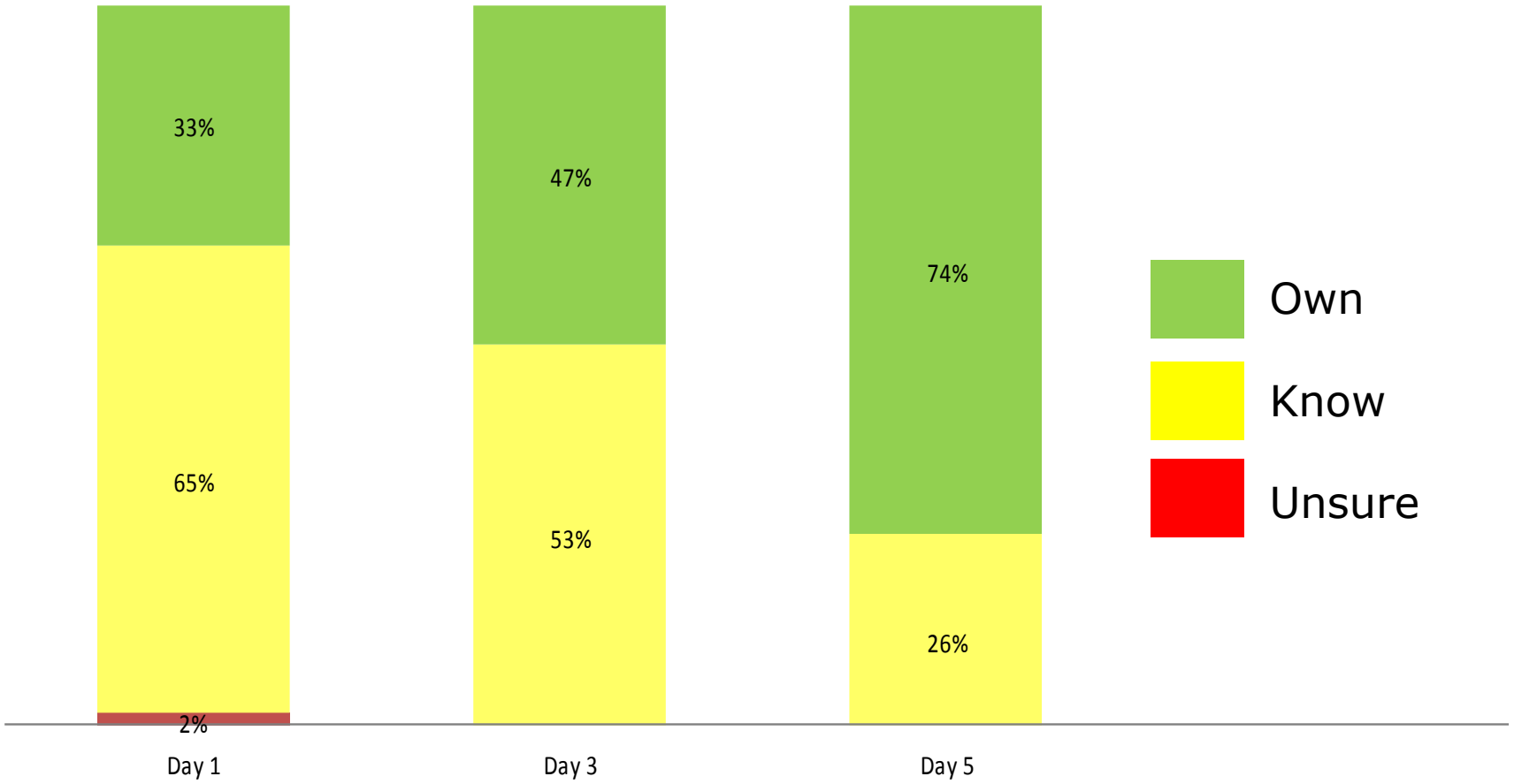
Poorly worded question
- throw out question
- adjust scoring
- revise question


Unpacking ILOs
Using a **TOS** to create an assessment
Using a TOS to **analyze student learning**
Using a TOS to **critique & improve** an assessment
Using a TOS to create a **unit assessment plan**
Using **select-response** items
Using **construct-response** items

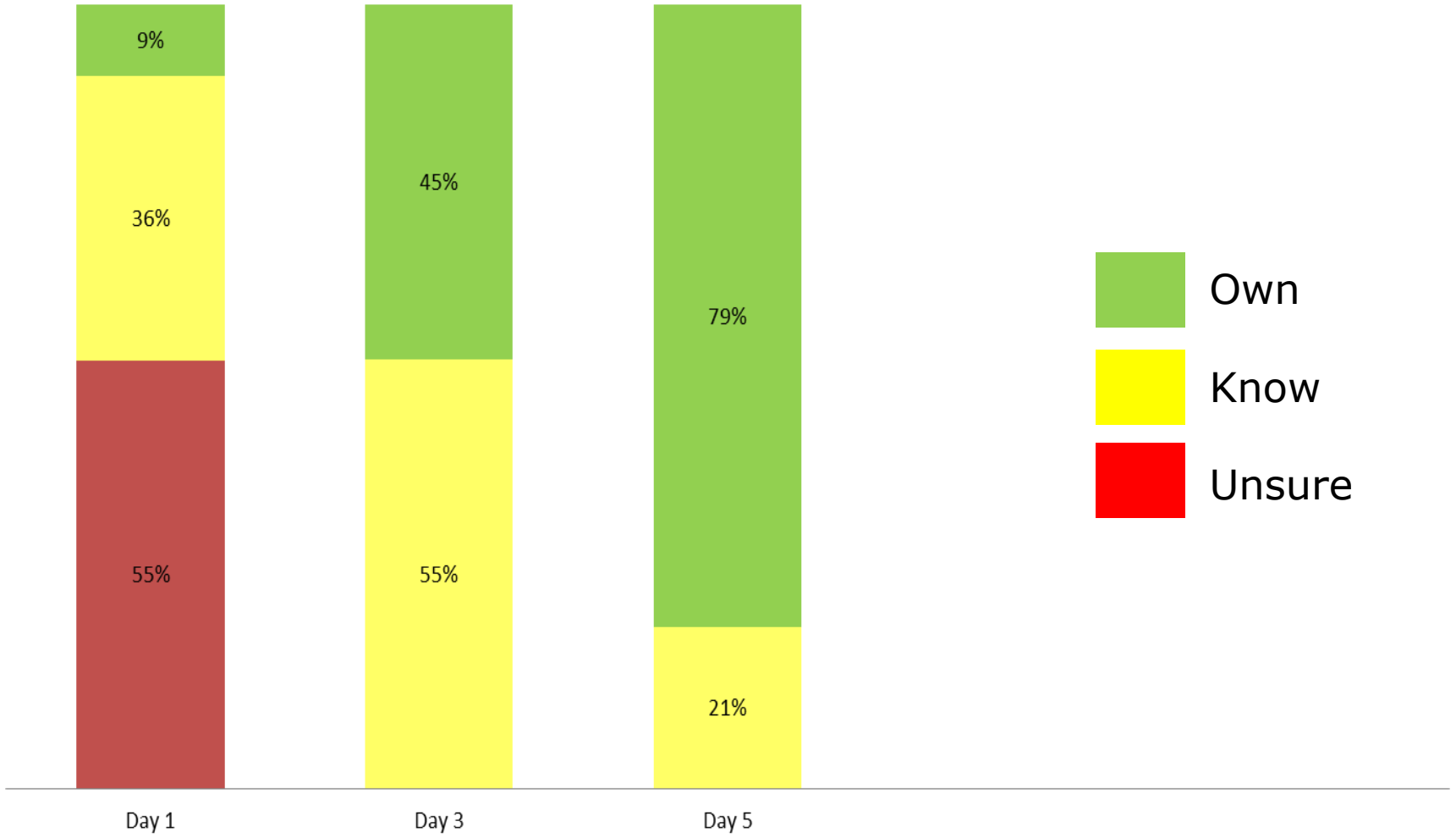
"Haven't we always done this?"

Question raised by
U.S. assessment scholar,
2010

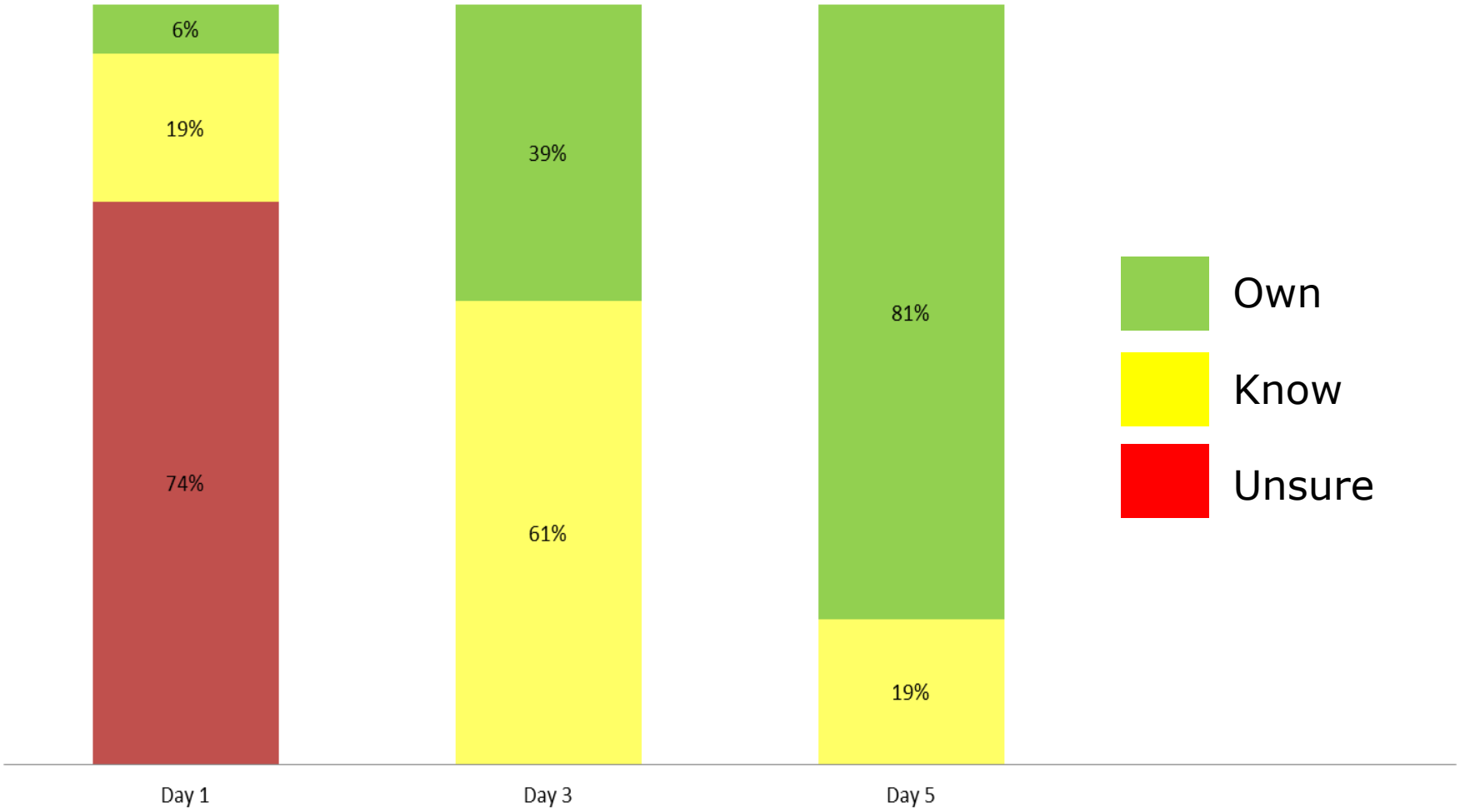
Participant Self-ratings
Bloom's Taxonomy

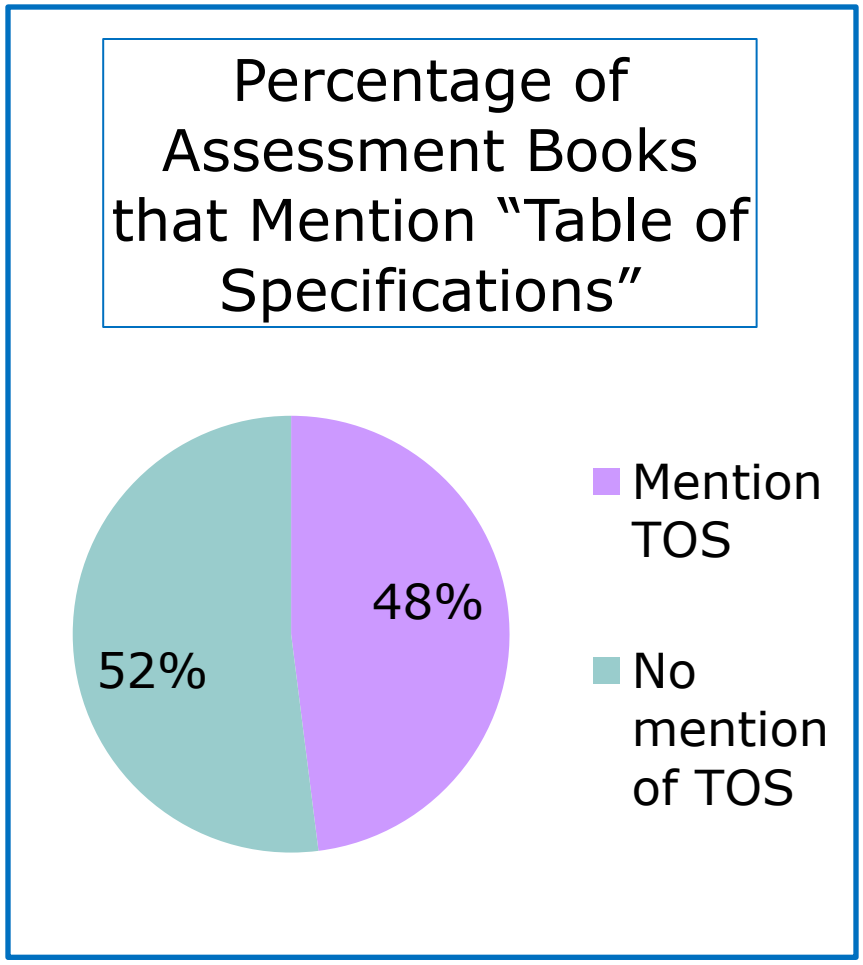


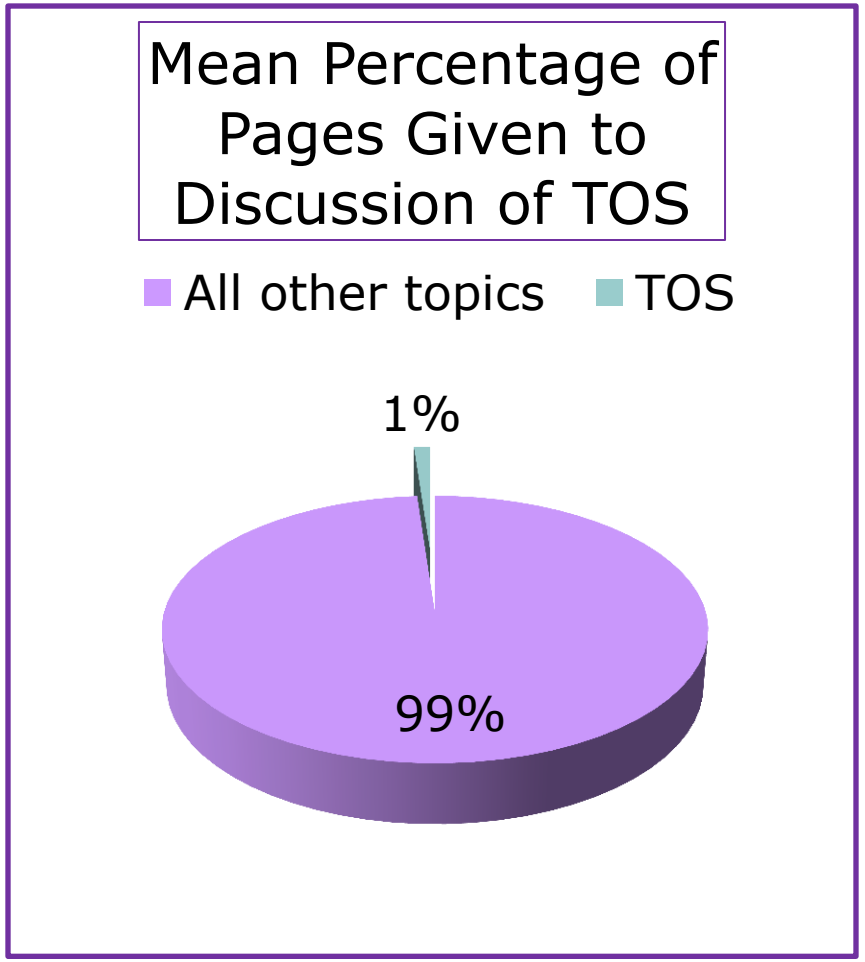
Participant Self-ratings
Unpacking Curriculum



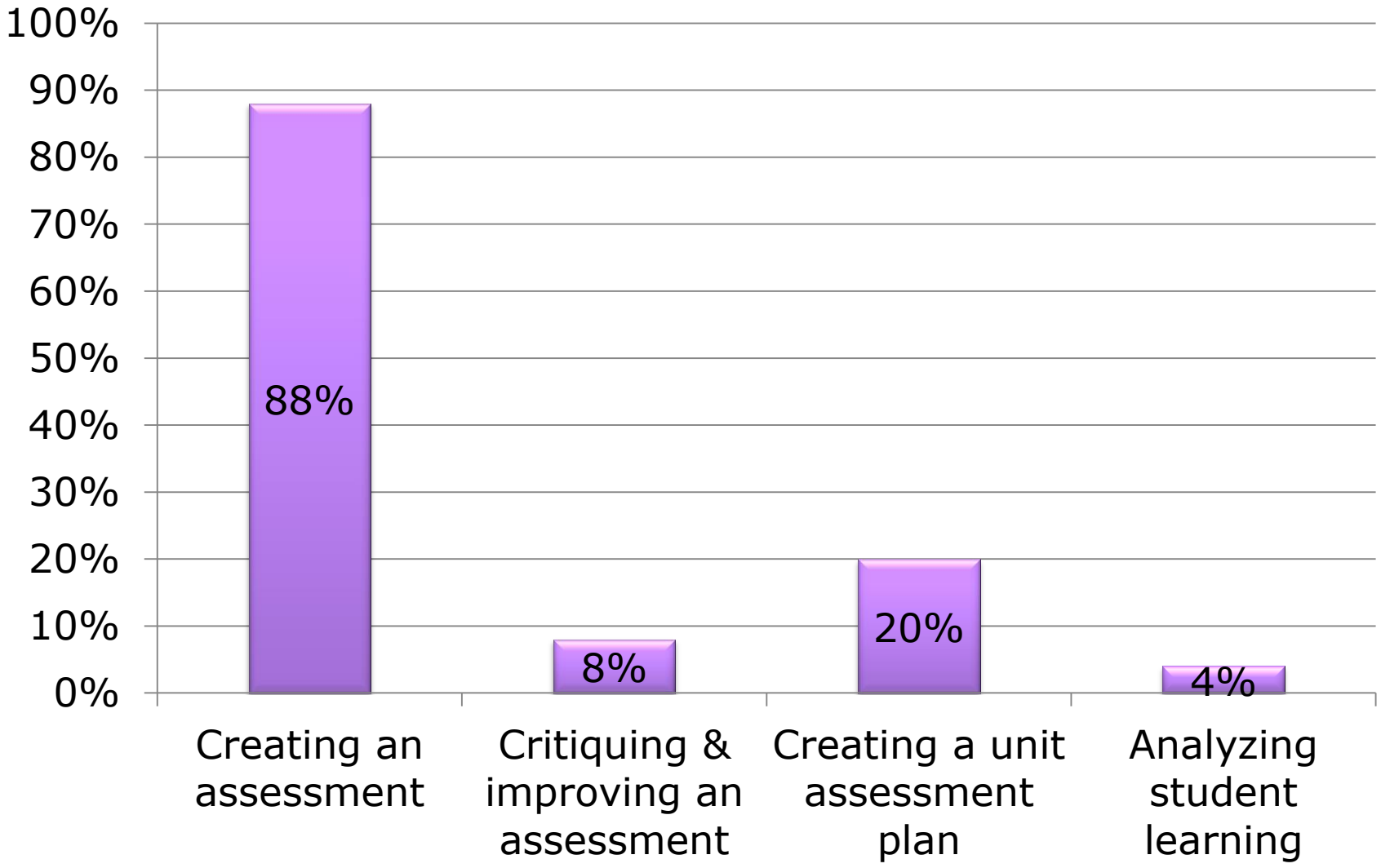
Participant Self-ratings
Table of Specifications



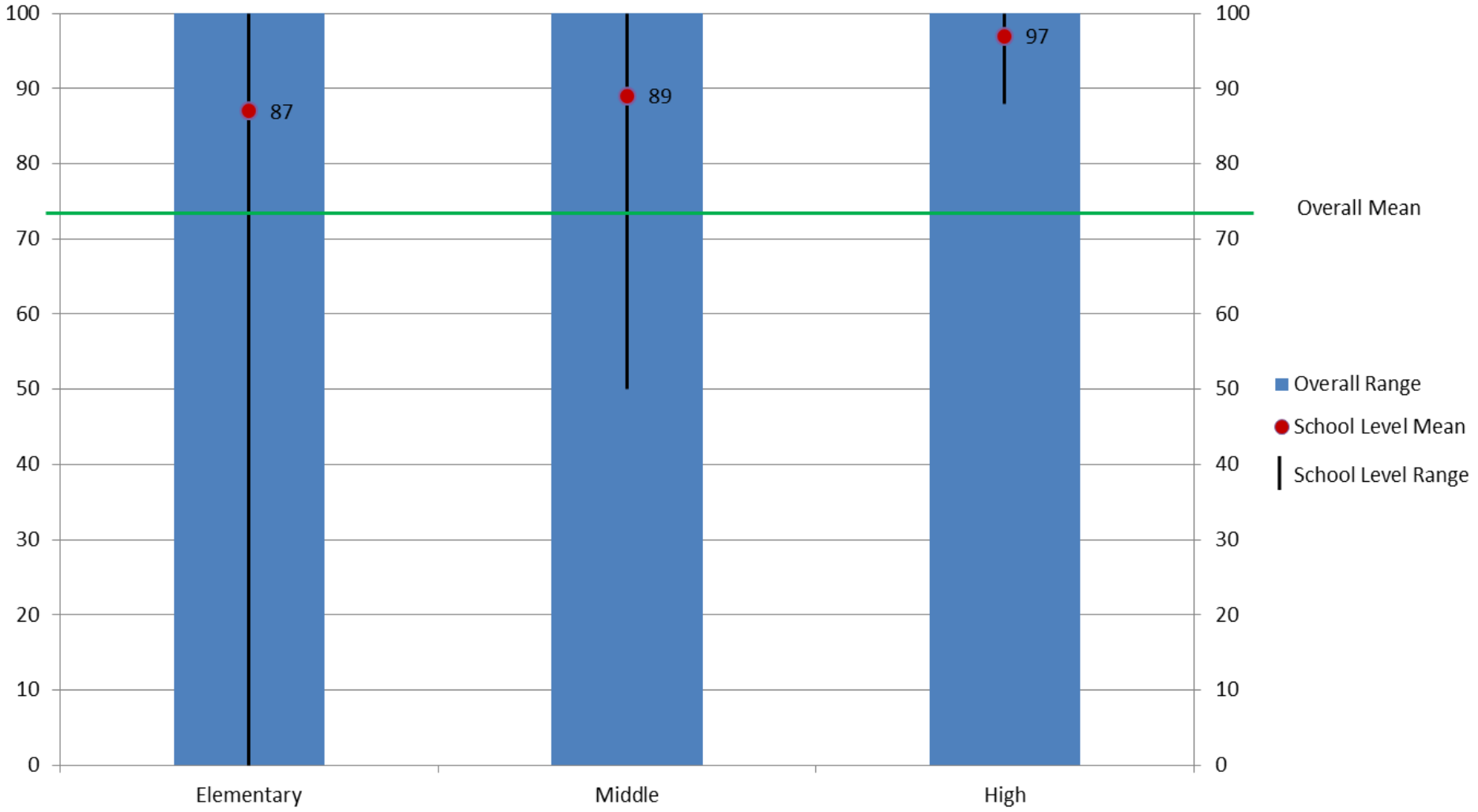

Percentage of Assessment Books that Mention "Table of Specifications"
48%
52%
Mention TOS
No mention of TOS


Mean Percentage of Pages Given to Discussion of TOS
All other topics
TOS
1%
99%

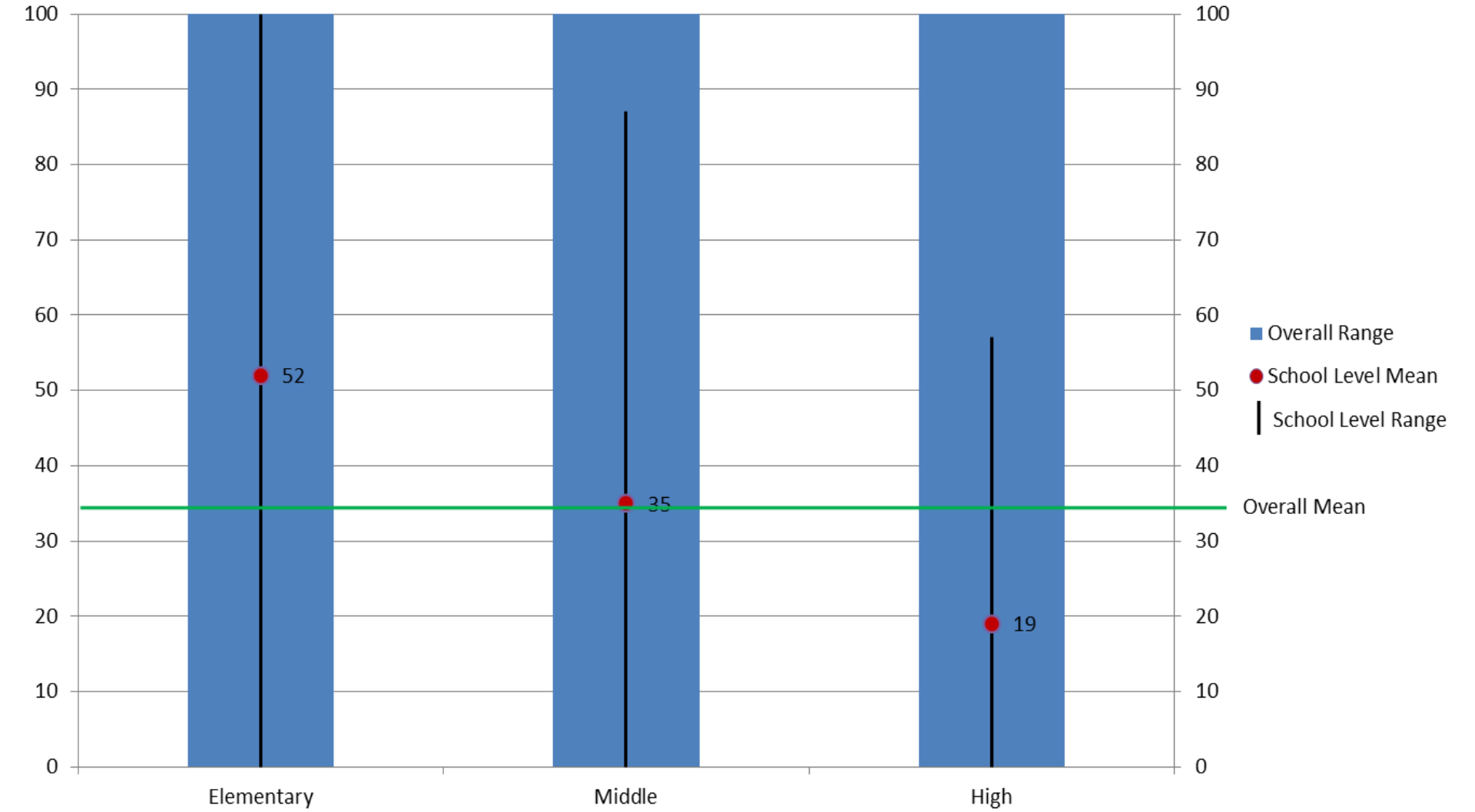
Percentage of Texts that Mention TOS's that Specify Various Uses



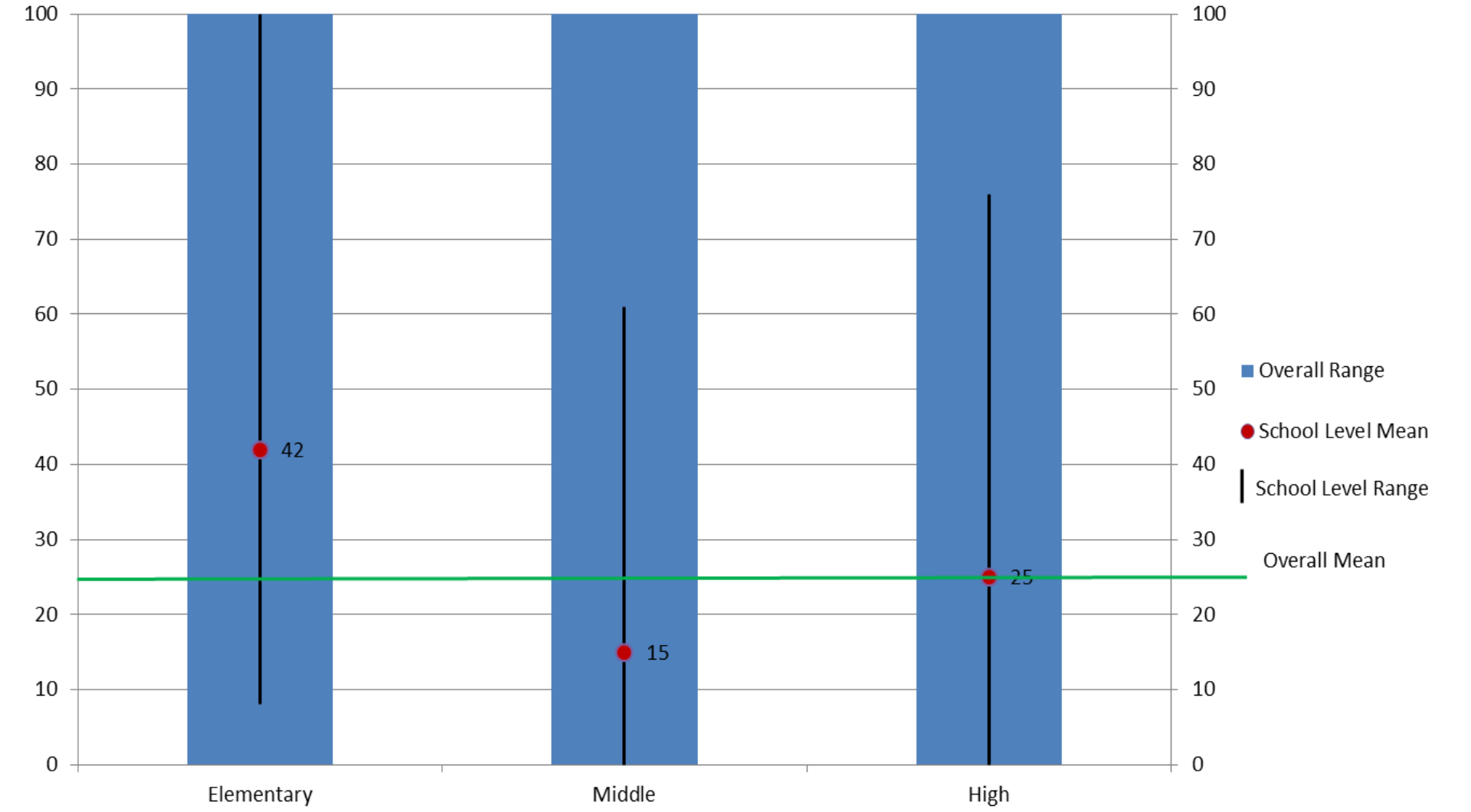
Percentage of **Accuracy of Unpacking ILOs** by School Level



Change in **Percentage of ILOs Assessed** by School Level



Change in Percentage of **Test Items Aligned to ILOs** by School Level



Assessment Literacy— Connecting Curriculum, Instruction, and Student Learning

C = I = A

- C
- CL

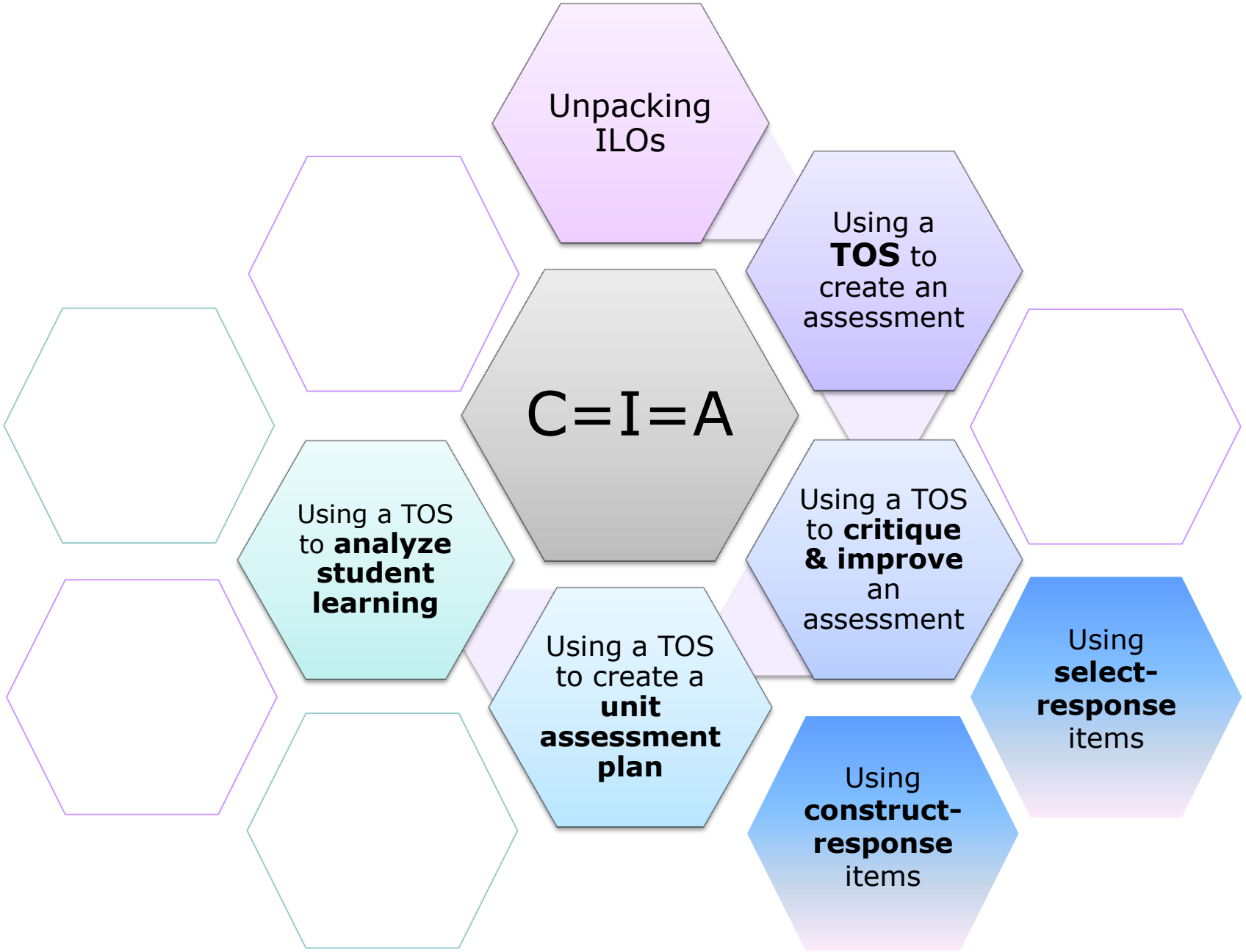
- C
- CL

- C
- CL

$\therefore$ **C = I**

I = A

A = C


Unpacking ILOs
Using a **TOS** to create an assessment
C=I=A
Using a TOS to **analyze student learning**
Using a TOS to **critique & improve** an assessment
Using a TOS to create a **unit assessment plan**
Using **select-response** items
Using **construct-response** items